segelfliegen magazin

segelfliegen
magazin

soaring next level

Meteorology
What influence does vegetation have?

Competition
New rules for more safety

Motivation
Fearing the mountain

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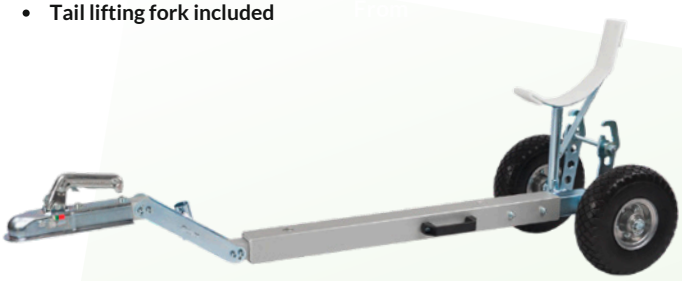

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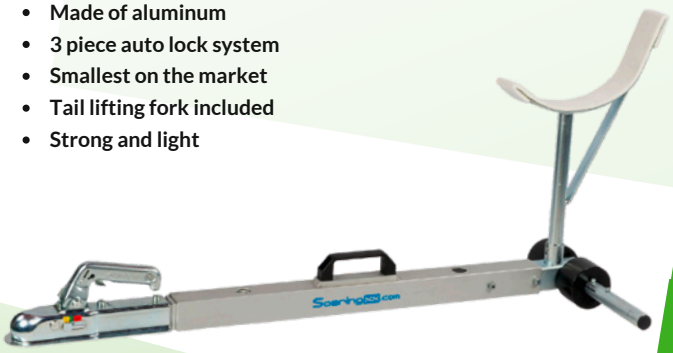

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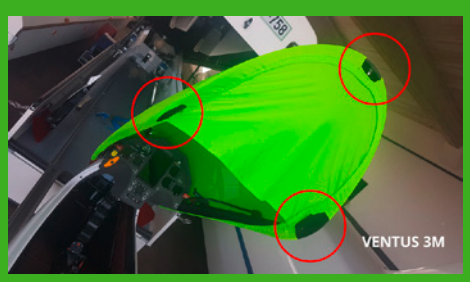


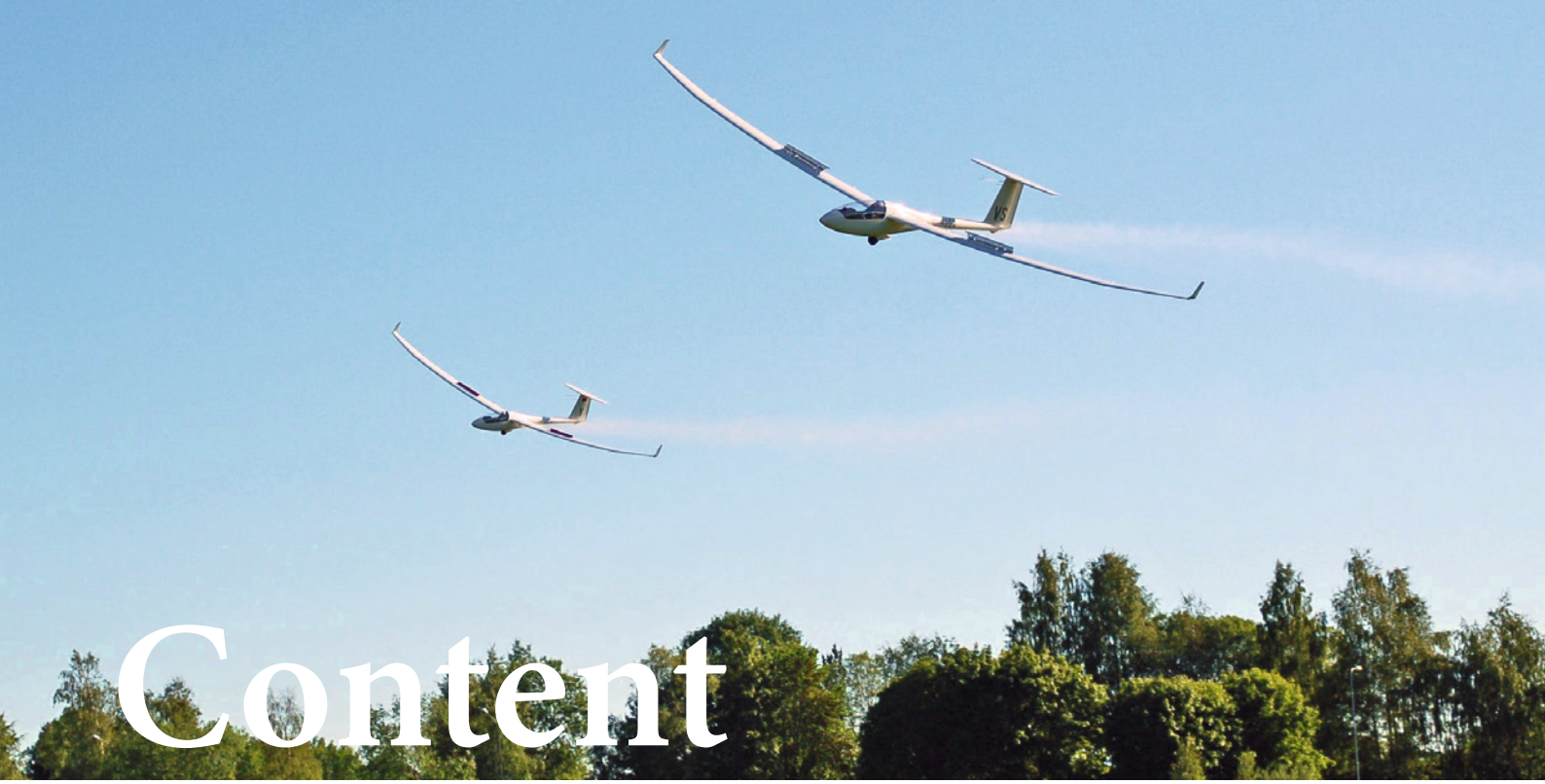
EDITORIAL

Ernst Willi
Deputy Editor-in-Chief

Dear readers,

now I know again exactly why I love gliding. In the past days I have had a wonderful day of flying. The approach to the Alps was tough at first, but once I arrived in the clear, cold spring air, I experienced what makes gliding unique. It is the glistening light of the strengthening spring sun over the freshly snow-covered Swiss and Austrian Alps. It is flying into a mountain valley with a lot of fresh snow, which has been eroded to the timberline. It is a beautifully shaped cauliflower cloud clinging above with a partially darkened ground. It is my friends in a two-seater, neatly turning in with the momentum of their kinetic energy below, shooting off in a great arc into the bright blue sky and immediately climbing away. It is the pressure all over the seat thanks to brute spring thermals, which I can barely pull away with the control stick, even with a full pull to the stop. Then it's the first turn with a constantly high-pitched beeping vario. And at the very end it is the circling over one of the most beautiful regions in the world, the Engadin, which does not only magically attract the rich and beautiful of the world but also us glider pilots. This moment of turning into a powerful four-metre updraft (vario is neatly compensated) in the Engadin still accompanies me when I fall asleep and I get goose bumps again when writing these words. This is how the best of all hobbies goes for me. During winter, my passion for this sport has almost been buried by various buzzkills. There are airspace designers who believe that every type of drone and every new aircraft needs its own airspace (e.g. Gran Paradiso, Central Switzerland), and who constantly constrict my free-use playground like a viciously proliferating ulcer. There are important people (e.g. politicians) and especially those who think they are, who are convinced that they are so indispensable to our world that they must reserve the airspace of entire parts of the country for themselves and at our expense (e.g. WEF Davos, Berlin). There are the environmentalists who believe that the lives of grouse or chamois can only be saved by completely banning the movement of hikers or gliders (e.g. Mercantour, Vanoise). These are the park rangers who wait with binoculars and flarm receivers for me to violate their protected airspace with a wingtip, where breathing in and breathing out each require a separate permit. There are profile-neurotic aviation functionaries or officials who, thanks to their lack of expertise, are certain that our survival in cross-border flights is only possible through pointless flight plan information and the excessive bureaucracy it triggers at the stupidest moment (concentrated flight preparation). Today, there are more purposeful and faster methods of finding someone than via a flight plan form filled with airy information. Even a visit of several officials to the take-off airfield by helicopter seems to me to be a bit excessive for a personal information of the airspace violator (e.g. Sisteron). Gladly I can extend this list. But by now you probably know who I mean by „killjoy". I personally wish these contemporaries all the best. First of all, I wish them a flight like mine last week at least once in their lives. And above all, I wish us glider pilots one thing - that they just leave us alone. Take care of yourself.

Yours sincerely,



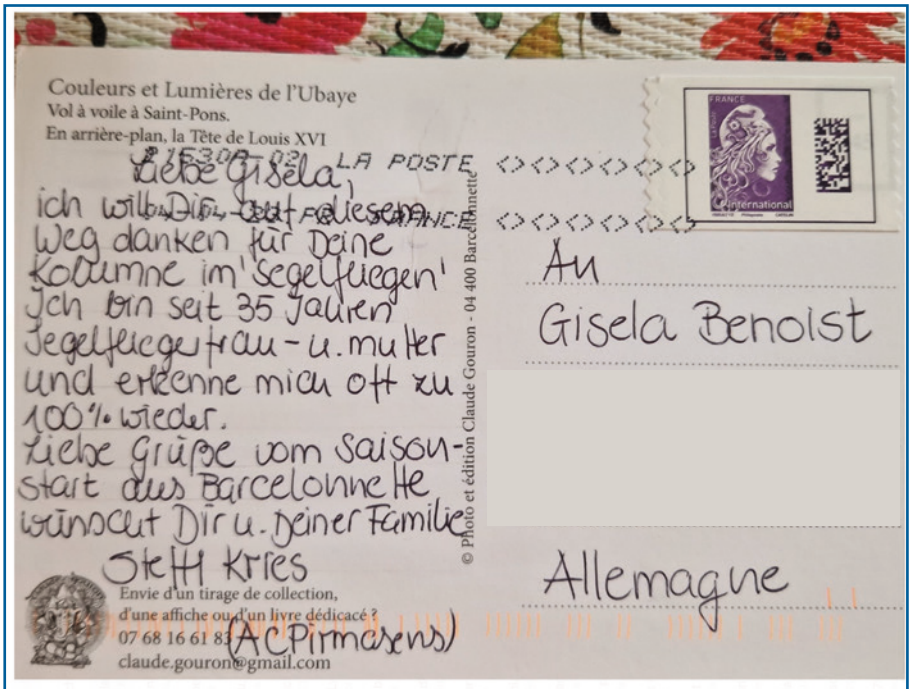
Content

Title: Eddy Supersperger, ASW 24, Dachsteinplatteau just before sunset **Picture: Lothar Schwark**

THANK YOU!!

I have always been satisfied with segelfliegen magazine and can recommend it to others, and I do. I find the standard very high and even higher than what I experience in Denmark. The articles are interesting and informative. I am particularly interested in the topics of meteorology, tactical flying and new gliders. Through the years of my subscription I have gained a lot of insight and the copies are still on my shelf and continue to be read. In my club I teach XC flying and I have found much inspiration in your magazine.

Tom Finsen, Viborg DK



Dear Gisela, I want to thank you for your column in segelfliegen magazine. I have been a glider pilot's wife and mother for 35 years and often recognise myself 100 percent. Best wishes from the start of the season in Barcelonnette to you and your family from **Steffi Kries, AC Pirmasens**

Compliments on issue 03-2024 of segelfliegen. I really liked the well-balanced selection of articles! It starts with Mathias Schunk's unsparingly frank report about his accident at the Grand Prix. I had only heard about it through the grapevine. So it was extremely informative to find out how it happened and I was relieved to see that he is well on the way to recovery. I also looked up Bruno Gantenbrink's old lecture (and Clemens Ceipek's lecture on flight accidents at the Austrian Gliding Day) and referred to it at our season-opening briefing at the club. I also liked the historical outline of Robert Kronfeld and - especially interesting for me - the articles by Holger Weitzel on Spanish energy lines and the article by Oliver Predelli on the development of thermals on the ground. Oliver's essay in particular closes an important gap in the understanding of the formation of updrafts near the ground, which has not been documented anywhere so far. Last but not least, poetry was not neglected. For example, Stefan Selke's „Carat Impressions" or Gisela Benoist's thoughts on the start of the season. In short, exciting and practical entertainment from the first to the very last page.

Henry Blum, Gäufelden

At the competition last year in Prievidza, Karol Staryszak and I discussed possible solutions for improving safety at central competitions in the future. A few years ago, he had already posted a very open hearted letter to the community on the internet, on the occasion of the fatal accident of a friend at the FCC 2016 (www.soaring.eu/?p=20949). Unfortunately, this event again provided a tragic occasion to raise the matter in 2022. Two young pilots from Poland respectively Lithuania were killed in a collision near Martin, about 35 km north-east of Prievidza.

During our discussions it very soon became clear that the tasks currently set in classical competitions (not Grand Prix format!), AST and AAT, with the 1000 point scoring system, encourage massing. Conservative flying and taking advantage of the competition often pays off in the end.

FLARM also has disadvantages

In addition, it is becoming more and more apparent that one of the most beneficial inventions of the last decades, namely FLARM, has a rather disadvantageous effect in competition. Finding, and thus possibly taking advantage of, competitors is made much easier, while the devices usually fail in preventing dangerous encounters or even collisions in competition. The constant proximity to other aircraft leads to predominantly false warnings, which are unconsciously

◂ Peter Hartmann (left), Andreas Lutz (right) and a Texan sheriff at the wreckage of the ASG29 after Peter's collision with Louis Bouderlique at the 2012 World Championships in Uvalde. Fortunately, both survived the accident, which happened while thermalling in a small crowd. Louis was able to land safely with his wing-damaged ASG29, Peter saved himself with the parachute after the tail section broke off.

New rules for more SAFETY

The IGC is finally taking a serious look at the topic of safety at central gliding competitions – we should not miss this opportunity!

Text: Wolfgang Janowitsch, Pictures: Claudia Hartmann, Jens Trabolt, Wolfgang Janowitsch

faded out after a short time. This effect has been known in professional aviation for a long time – an alarm that arrives constantly (and mostly in vain) is ineffective.

Karol organised a discussion group on the net after our talks. A ban on the use of data emitted by FLARM (e.g. mandatory „stealth mode") proposed by various competition pilots was very soon discarded, as in the future all airspace users (ULs, drones...) will (have to) be visible in some way. We should

So here are the competitors! FLARM has fundamentally changed competition flying, and not only for the better

therefore think about whether there are other ideas that can be used to equalise the field of participants.

A first approach to a solution is a slightly modified form of the AAT. The task is started somewhere within a departure cylinder with at least a 10-km radius by pressing the "event marker". It is not allowed to start again before 10 minutes after a valid take-off. If this time is not reached between two "events", the earlier one counts. The minimum crossing altitude over the target circle is 1000 m below take-off altitude, whereby the 1000 m can be adjusted by the competition management depending on the weather.

On the LX-Nav homepage www.gliding.lxnav.com/beta/ there has recently been a test version of the firmware (9.06b) for all LX90xx units which supports this type of take-off („Start within Zone").

The IGC is becoming active

Through an initiative of the IGC President Peter Eriksen, himself a participant in numerous international events, the danger potential of gliding competitions and possible solutions have recently been systematically analysed and discussed. Immediately after this year's IGC meeting in Copenhagen at the beginning of March, some active competition pilots, stewards, jury members, team captains and the OSTIV chairman Rolf Radespiel met for an intensive first exchange of ideas. In a very structured way, dangers were defined, their possible consequences and the frequency of their occurrence were assessed with green (minor consequences, rare occurrence) via yellow to red (possibly fatal consequences, frequent occurrence).

Not surprisingly, the systematic analysis confirmed the gut feeling of the active competition pilots present: The greatest danger is a possible collision. Not only is there about a 50% chance that it will be fatal for those involved, but I can only influence this risk to a limited extent through my own behaviour.

In the search for an objective assessment criterion as to whether a certain measurement really reduces the risk of collision, we very quickly agreed that the number of actual collisions is (fortunately) too small to identify a possible trend. However, there are already several software tools that allow an, at least partially automated, evaluation of potentially dangerous approaches. At the moment, a working group is already busy evaluating the IGC files of past

Safety-Workshop in Kopenhagen, early March 2023. From the left: Henrik Svensson (OSTIV), Wolfgang Janowitsch, Rolf Radespiel (OSTIV), Frouwke Kuijpers (TC Niederlande), Mandy Temple (TC Australien), Karol Staryszak, Russell Cheetham

competitions in this regard.
We hope that the result will be a kind of „standard distance" that is observed by the vast majority of pilots. We are looking for the safety distance that the majority feels comfortable with. The consequences of falling short of this perceived safe distance remain to be discussed.
In principle, it would be desirable if we succeeded in modifying our tasks in such a way that dangerous masses hardly occur any more. Whether it is possible without supervision and, in extreme cases, punishment by the competition management, remains to be seen in practice.

Any input is welcome!
I have the feeling that, for the first time in my 40-year competition career, a window is opening in which real and far-reaching changes in favour of safety can prevail in central competitions. The motivation of all that are involved is great, even sacred cows could be slaughtered, such as the reduction of the number of participants in Class 1 competitions to one pilot per nation.
My personal opinion is: We should try to change the competition rules in such a way that individual flying is rewarded more than tactically clever following. This would probably automatically reduce the masses.

Here are a few thoughts on this:
Also in classical competitions (1000 points classification) one could consider the regatta start, e.g. combined with arrival altitude 1000 m below departure altitude. One of the most dangerous phases, namely the waiting and "poker" before take-off, would be omitted.
This could be combined with a ranking as in GP - this might give more motivation to fly ahead. And it has often been calculated retrospectively in the case of 1000-point evaluations how it would have looked with a placing evaluation – usually almost nothing changes.
In contrast to the GP, however, I would like to see that in the classic competitions not only high-speed races are flown over sprint routes. It's also part of the game to test the limits of the weather. I can remember statements by task setters from earlier times who said: „If 2/3 of the field fulfilled the task, the task was correctly set" – and in contrast to today, we hardly had any motor gliders at that time.
I would gladly pay a few euros more for entry fees, F-tows or self-launches if the number of participants/classes would be reduced in return. Maybe smaller airfields would then also organise a competition.
I'm sure there are other ideas on how to streamline the organisation of competitions to get through with as few staff as possible; it would be nice if one or two organisers could be found who are willing to try out new ideas to test their practicability and acceptance by pilots before they start on a proposal for the IGC. In this sense, I am looking forward to any feedback on this topic to:
wolfgang.janowitsch@gmail.com
The next milestone in this matter will be a discussion within the framework of the OSTIV meeting on the sidelines of the European Championships 2023 in Leszno. Together with all pilots who are concerned about this issue (and that should be everyone!), we will be collecting the different opinions and points of view on a rest day. The IGC has already initiated one important thing to improve safety this year: From 2024, an anti-collision light (canopy flasher or similar) will be mandatory for all participants in IGC competitions! ♦

Soaring next level

The story begins with a wealthy American who had a burning ambition to go faster and higher in a glider than anyone had ever done before. This insatiable ambition eventually led him to become the world's first space tourist, embarking on a historic journey into space. His name is Dennis Tito. However, someone else wants to continue his work: Gordon Boettger.

Text: Simon van den Eijkel Pictures: Gordon Boettger

▾ ▸ View of Reno, Nevada - through night vision goggles

Flying to sunset: crossing borders

Tito's professional success in the financial world allowed him to fulfil his dream of becoming a space tourist in 2001, when he embarked on an eight-day visit to the International Space Station (ISS) after launching from Baikonur Cosmodrome..

However, orbiting the Earth at 400 kilometres above the surface wasn't enough to satisfy Tito's aspirations. He set his sights on gliding and aimed to surpass the 3,008 kilometre distance record set by Klaus Ohlmann in 2003. To achieve this, he devised a plan and acquired four Schempp-Hirth Arcus M gliders, strategically placing them in prime locations for soaring: the Sierra Nevada range in California and the Andes in Argentina.

But Tito didn't stop there; he modified each glider (all called 'Delta-Tango') with four distinctive features that set them apart from all others in the sky:

- A JET Selflauncher – The most striking modification was the addition of a retractable PBS TJ100 turbojet engine, providing 292 pounds of thrust and enabling self-launch capability. With an 88-liter fuel capacity, these gliders, now referred to as "Arcus J," have a range of 400 kilometres.
- Autoflaps – To alleviate the pilot's workload during extended flights, glider pilot and chief engineer on the Perlan Project, Morgan Sandercock, developed an innovative system for autoflaps. This system automatically adjusts the flaps based on flight parameters such as airspeed and G-loading. It offers three modes: fully automated, manually but electrically driven, and fully manual.
- Increased maximum speed – The Arcus is capable to fly at higher VNE. This is ideal for high-altitude, high-speed wave flying. Since we know that our True Airspeed (TAS) increases with height, the flutter speed will come down at high altitude. These Arcus can still fly 280 kph at 28,000 feet.
- Nightflying capabilities – The gliders are equipped with strobe lights, an artificial horizon instrument, and night-vision goggles. All instruments are also specially coated so that they're not 'blown-out' by the night-vision goggles. This makes flights into dusk and night possible in the US, where night-VFR is conditionally allowed.

Tito embarked on remarkable flights with these unique experimental gliders, including a 2600 kilometre journey in 2018 from Nathuel Huapi in Argentina. But it was after that particular season that Tito got out of touch with the sport. A shoulder injury sustained during weightlifting prevented him from pursuing further lengthy flights, ultimately causing him to step away from gliding without surpassing the distance record.

Nevertheless, the gliders he left behind may still have a chance to achieve that feat.

New pilot, new luck

Enter Gordon Boettger, a former Navy pilot and current FedEx aviator, who acquired one of the modified Arcus gliders. His Arcus J, bearing the registration N887DT, is stationed at Minden Lake-Tahoe airport, serving as his perfect "surfboard" for exhilarating flights.

Boettger has already made a name for himself in the gliding community with impressive flights, including a 2066 kilometre journey on May 8th of this year Taking off from Minden alongside Brad Jackson, he soared through the Sierra Wave for 11 hours, continuing even after sunset with the aid of night-vision goggles, capturing incredible pictures over Reno, Nevada.

Sunset and no end

Curious about the experience of flying at night, I had the opportunity to speak with Boettger. He described it as

Impressions from the flight with Gordon Boettger in Minden, Nevada. Thickly packed up to 5000 metres.The black line on the canopy (picture above) is an extra layer that doesn't fog up! Very useful, but looks a bit strange

"next-level stuff," comparing it to his time flying the E-3 Sentry for the Navy in the Persian Gulf. Landing on aircraft carriers at night required immense concentration, and the same focus is essential in a glider equipped with night-vision goggles, without the aid of runway lights. Boettger emphasized that night flying is not merely a gimmick for taking cool photos; it serves the purpose of expanding soaring flight distances using mountain wave lift. His ultimate goal is to accomplish a two-day flight downwind into central United States, a feat that can only be attempted once or twice a year due to specific weather conditions.

Boettger is also eyeing the impressive milestone of 3000 kilometres. For such a record-breaking distance flight the wave should be powerful throughout the day and into the night.

This would be when the wind comes from the west and steadily increases with height. If there is enough moisture, lenticularis clouds will form and mark the wave line. With too much moisture, navigating the wave line will become very difficult. Wave flying in the night might perhaps be even easier than during the day, as there are no thermals that can disrupt the wave.

Soaring adventures

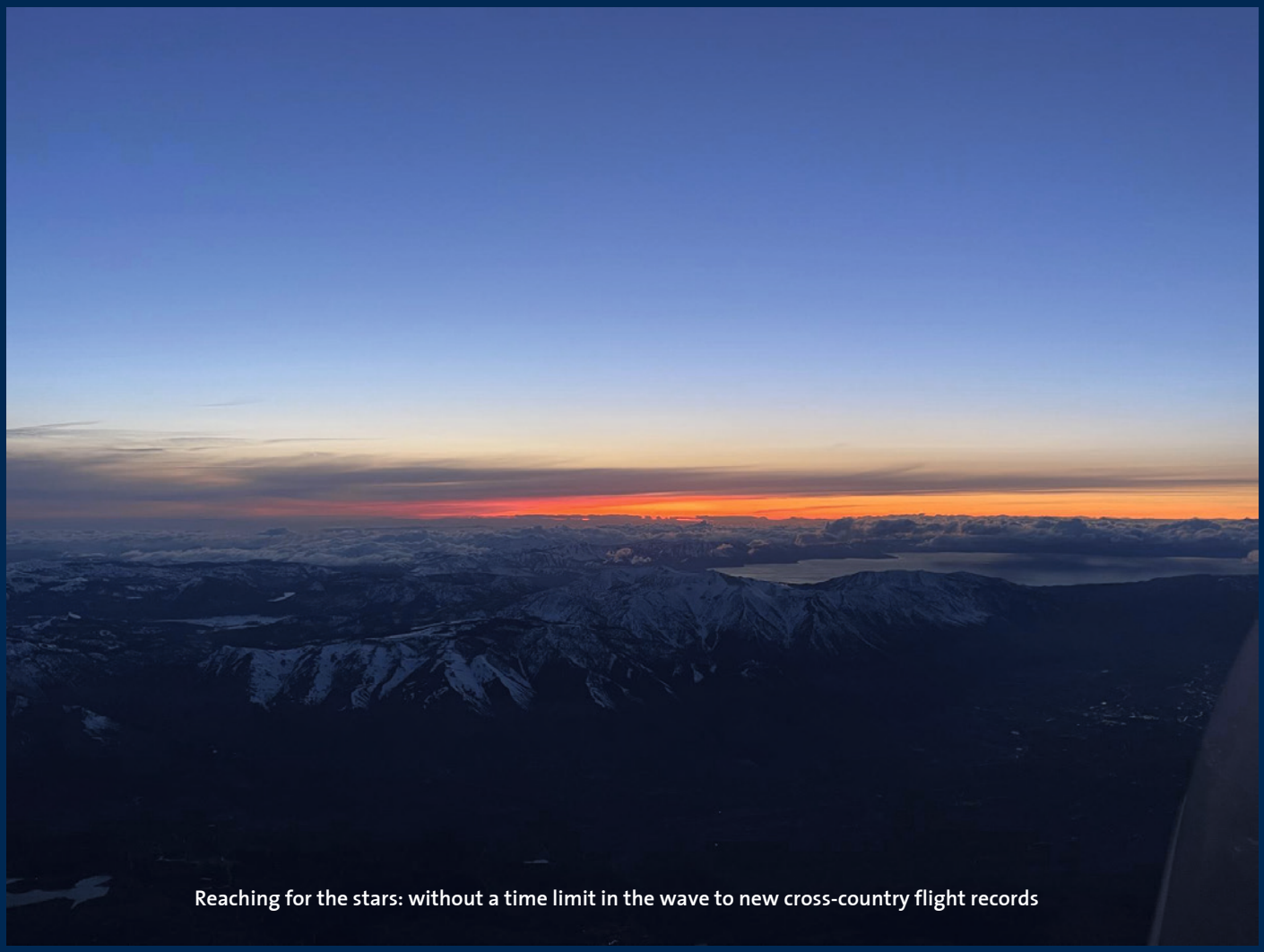
As I listened to Boettger's account, I couldn't help but be amazed by the sheer thrill of flying in these idyllic conditions, witnessing sunsets and moonrises, while remaining completely focused on the limited view through night-vision goggles. It's a pursuit of pushing boundaries, aiming to achieve what has never been done before.

I was eager to experience even a fraction of this adventure, a chance to experience the Sierra Wave, the Arcus and hear from Gordo in real life. That chance came quicker than I expected. Through the world of social media, Gordon and I connected. I got to visit the SSA Soaring Convention in Nevada for WeGlide and this is where we first shook hands. He asked me if I would join him for a flight. I, of course, happily obliged.

At 200 km/h at 5000 metres

The airport was covered in snow when I arrived. Nevada had seen one of its strongest winters and a snowstorm visited last night. I found Gordon and the Arcus in a hangar where he told me that the weather looked marginal (remember that), but that if a gap in the sky would open up, that would mean the wave was on.

We towed the sailplane out to the runway hold short where ironically a sign said 'Fly Quiet'. Gordon and I put on suits that looked as if Tito took them straight out of the Soyuz, and



Reaching for the stars: without a time limit in the wave to new cross-country flight records

decided that flying quietly wouldn't be possible as we started the PBS TJ100.

We quickly found ourselves at 1000 AGL entering the wave. For a flatland pilot and thermal enthusiast like me, this was quite the experience. The Sierra wave was marked with beautiful smooth lenticularis clouds that spanned over 180 kilometres. We could easily cruise along this line with 200 kph at 5000 metres, the Arcus felt more akin to a learjet. We admired the clouds, saw a few airliners getting vectored around us and discussed life for about 3,5 hours before we made our way back to Minden. The statistics of the flight show how ridiculous conditions here can be: 700 kilometres in total with 216 kph average, and that on a marginal day!

We tucked up the Arcus in the hangar and went for burgers at Gordo's place. (*A more detailed description of this day can soon be found in WeGlide magazine.*)

The perfect wave

So what can we expect from this golden combination: Gordon, his unique Arcus J, and the Sierra Wave system? Well, when time is no longer a problem, the amount of distance legs will be the constraint, If the wave would stand from Air Sailing up north, to Inyokern down south, Gordon could land in Minden with 3000 kilometres in his pocket. If he were to land at a different airfield, or fly out of the wave and be able to attach to the wave again, I reckon flights up to 3500 kilometres would be possible!

Meanwhile Gordon Boettger flew 3059 km in the wave from Minden on 19 June 2023. The flight with co-pilot Bruce Campbell in an Arcus M took over 17 hours.

And for Gordon, what would be next after such a flight? A trip to space perhaps... ♦

Thermals

influenced by ground and vegetation

What influence does soil moisture have on the formation of thermals?

Text und Pictures: Detlef Müller,
Christoph Kottmeier

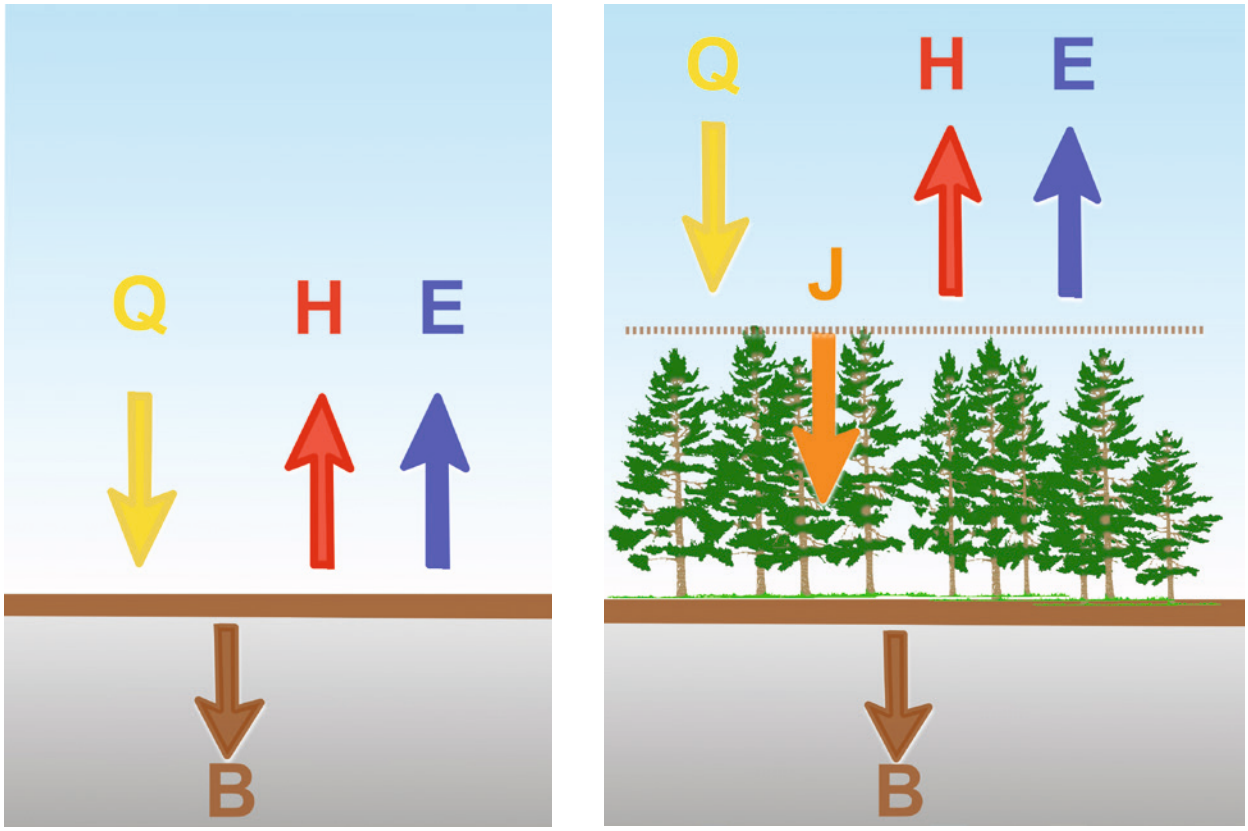
The theory lessons for the glider licence already deal with the radiation and energy balance of the atmosphere. There we learned that a significant part of the sun's radiant energy is converted into heat by absorption at the earth's surface. How much solar energy arrives at the Earth's surface depends on the reflection and absorption in the atmosphere.

If one wants to determine the conversion of the radiation energy at the earth's surface into other forms of energy, the reflection of the radiation as well as the angle of incidence of the radiation must be taken into account. It depends on the time of day and the season how steep or flat the radiation is. Finally, the radiation balance Q (the available radiation energy per square metre) describes the energy available for conversion into other forms of energy.

Where the ground is heated by radiation, the earth's surface transfers some of the heat by conduction to deeper soil layers (ground heat flux B) and some to the air directly above (flux of sensible heat H). This heating of the air is already replaced at low altitudes by the turbulent flow of sensible heat (further called H). H decreases with altitude, whereby the heating of the higher air layers takes place because a part of the heat transferred by H remains in each altitude layer. Convection, i.e. „thermics", with its up and downdrafts, is responsible for heat transport.

At ground level, the flow of latent energy E also occurs in connection with evaporation. This transport of water vapour is also turbulent and is carried by the updrafts and downdrafts. However, it only changes the temperature of the air if the water vapour liquefies – especially in clouds (***picture 1***).

The energy conversion processes at the earth's surface are described by the energy balance equation in the form Q - B - E - H = 0 or Q = B + E + H, i. e. the energy flows radiation balance (Q directed towards the earth's surface during the day) and the ground heat flow B, the flow of sensible heat H and the flow of latent heat E (all directed away



Picture 1 Terms of the energy balance at the earth's surface: on radiation days, the energy flows (radiation balance Q, directed towards the earth's surface) as well as the soil heat flux B, the flux of sensible heat H and the flux of latent heat E (all directed away from the earth's surface) cancel each other out at the earth's surface (left). In the case of vegetation (right), the energy turnover in the plant stand must also be taken into account

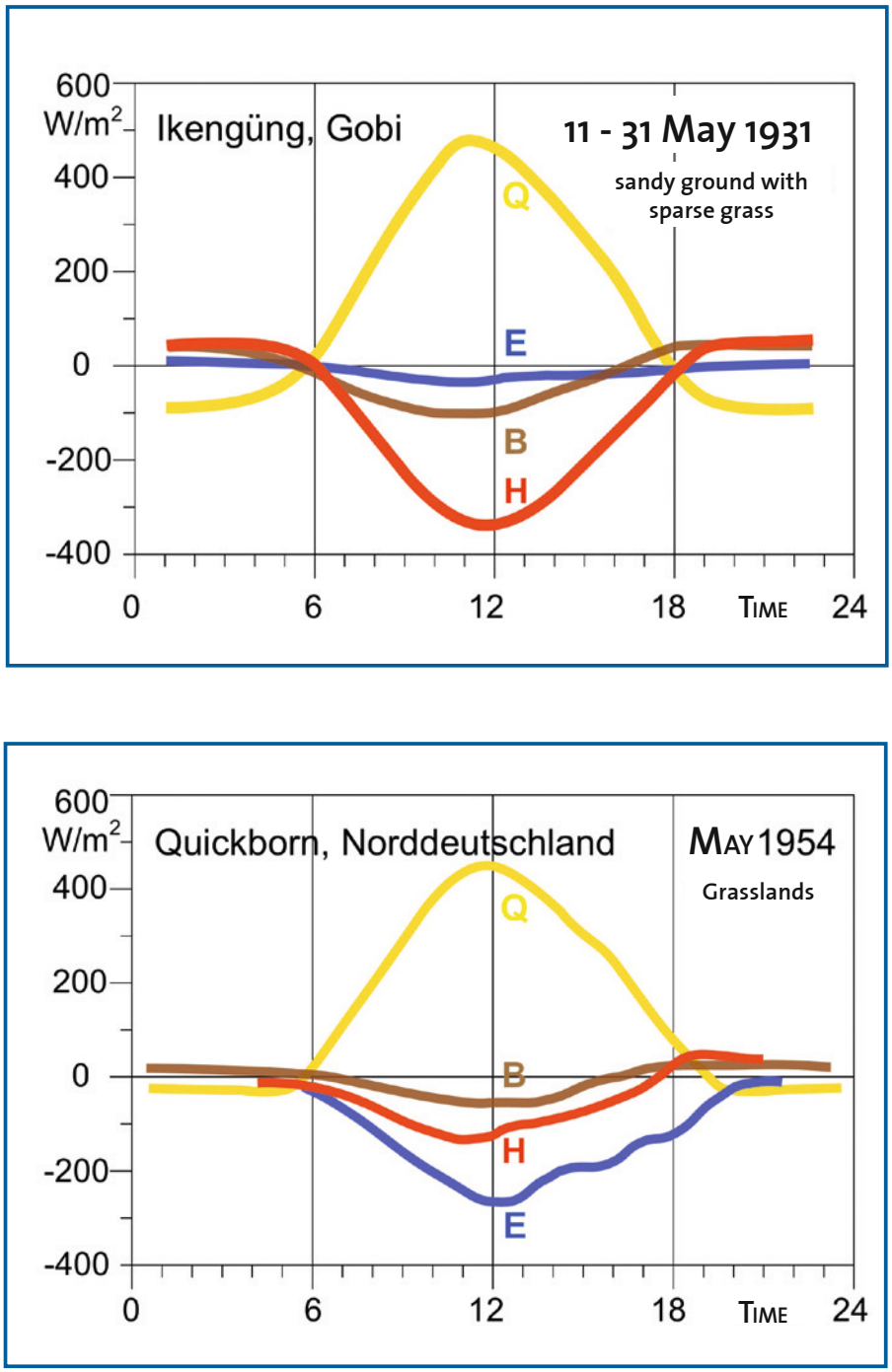
from the earth's surface during the day) cancel each other out. Q indicates how much energy is available to be converted into B, E and H. The energy is divided into three parts. Their distribution may vary at any time and at any place.

In the case of vegetation, the energy conversion in the plant stock (J) must also be taken into account. Now the upper edge of the vegetation is the surface of the earth. The energy transformation in the plant stock is also directed away from the reference plane during the day.

It is important for thermal development that the earth's surface – and thus the air near the surface – heats up particularly strongly. This causes the air close to the ground to experience lift and set up updrafts. Thus for the greatest possible flow of sensible heat we need the highest possible irradiance. The ground surface should be illuminated locally as steeply and directly as possible (few clouds) and be dark (low radiation reflection). A small latent heat flux (dry surface) with little evaporation is a huge advantage for large H. A low soil heat flux B (dry soil) also favours large H.

Picture 2 shows the daily course of the energy balance components on a radiation day over desert soil and over a moist meadow. In terms of magnitude, the components are distributed at midday as shown in ***Table 1***.

Over vegetation-free soils (desert), the flux of sensible heat H dominates over that of latent heat E. Over vegetation with sufficient soil moisture, the flux of latent heat dominates over that of sensible heat.



Picture 2 Diurnal variation of the components of the energy balance on radiation days: above desert soil with very small E (latent heat flux) and large H (sensible heat flux) during the day, below humid meadow with larger E (latent heat flux) than H (sensible heat flux)

	dry surface	damp meadow
Radiation balance (Q)	500 W/m²	500 W/m²
Soil heat flow (B)	100 W/m²	50 W/m²
Latent heat flow (E)	0 W/m² (sehr klein)	350 W/m²
Current sensible heat (H)	400 W/m²	100 W/m²

Table 1 Typical energy balance values of dry and wet soil (same source as picture. 2)

Material	Conditions	Density (kg/m^3) * 10^3	Heat capacity (J/m^3K)*10^6	Thermal conductivity W/mK
Air	20°C, silent	0,0012	0,0012	0.025
Water	20°C, silent	1,0	4,18	0,57
sandy soil (40% pore volume)	fresh	1,6	1,28	0,30
	saturated	2,0	2,96	2,20
Clay (40% pore volume)	dry	1,6	1,42	0,25
	saturated	2,0	3,10	1,58
Peat (80% pore volume)	dry	0,3	0,58	0,06
	saturated	1,1	4,02	0,50
Stone	massive	2,7	2,02	2,90

Table 2 Heat capacity and thermal conductivity of various soil as well as water and air (same source as picture 2)

Two factors in particular determine soil heat flux: heat capacity and thermal conductivity. The heat capacity describes the energy that must be supplied to a body of mass m in order to increase its temperature by 1K. The thermal conductivity is the measurement of the substance's ability to conduct heat.

If we look at the corresponding values in ***Table 2***, we can see that different grain size determines water content. The finer the soil (high clay content and correspondingly low sand content), the finer the pores and the better the water adheres to the walls. And this is important: the higher the water content, the greater the soil heat flow. And the finer-grained the soil, the longer it retains water, and the greater it's evaporation potential!

As a rule, of course, the soil in our cultivated landscapes are not „bare", but covered with plants, which tend to reduce the soil's surface temperature and whose surface then represents the earth's surface. But here, too, soil moisture plays an important role: the flow of latent heat is determined by the vegetation and the soil water content. On one hand, plant transpiration is essentially determined by the water supply in the uppermost soil layers, and on the other hand, higher soil moisture leads to an increasing thermal conductivity and heat capacity, i.e. the soil heat flux.

Thus, detailed model calculations for seven weather situations of the COPS project (Convective and Orographically induced Precipitation Study, summer 2007) showed 0.3 to 1.7 degrees lower temperatures at 2 m height with wetter soil (+25 %) compared to the reference run and a 25 to 50 % reduced turbulent heat flux. With drier soil, the air temperature increased by 1.3 to 2.7 degrees

Vegetation	Transpiration power
evergreen conifers	1400-1700 µmol $H_2O/(m^2s)$
grasslands	3000-4500 µmol $H_2O/(m^2s)$

Table 3 Transpiration capacities of different vegetation

and the turbulent heat flux by more than 50 % on average.

The model results can be considered typical, since the model was supported by many measurement data and was based on real summer weather situations. The additional evaporation with vegetation thus modifies the distribution of the energy supplied to the earth's surface to the flow of sensible and latent heat via the soil moisture. ***Table 3*** shows the transpiration performance of evergreen conifers and meadows: Meadows are at the upper end of the transpiration rates, deciduous trees in the middle range and conifers at the lower end. The flow of latent heat behaves accordingly – with the same water supply.

If we look at our cultivated area, the vegetation is generally well adapted to the water supply of the soil: on rather well-moistened soil or soil with a high water storage capacity, plants with a high water consumption and high evapotranspiration can also be found! Accordingly, the rule on evapotranspiration still applies: the higher the soil moisture, the lower the heating of the air near the ground!

Let us summarise the considerations on the radiation and energy balance: The warming of the air close to the ground is greater,

- the more radiation energy reaches a surface and remains there (summer half-year, little cloud screening, steep incidence of radiation, low reflection)
- the lower the evapotranspiration (the transpiration of the plants and evaporation of the soil).

A side effect is that a higher soil moisture leads to a lower dew point depression and thus to a lower rise of the cumulus cloud base because of the continued evaporation and the lower temperature rise during the day.

40 years ago, we developed our thermal map for northern Germany on the basis of these considerations on soil moisture (www.imk-tro.kit.edu/5291.php). The regionally prevailing soils also cause typical differences in soil water contents, especially from one to two days after rainfall. Vegetation or crops are adapted to different soil and do not change the general picture. Sandy soil promote strong warming of surface, and loamy soil, of course, including waters and river floodplains, allow only weaker warming.

The type of soil thus causes a higher or lower warming of the air near the ground and thus, in turn, sooner or later onset of thermals and rising cumulus cloud base.

However, these considerations are not only useful for large-scale observations of the thermal quality of regions, but also for detailed considerations of locations with better chance to generate thermals. On days when the wind is weak, we need sufficiently large areas that can heat up more than their surroundings.

On the plain, these usually drier surfaces are characterised by a higher brightness, which, however, also means a reduced radiation balance (greater reflection, more radiation is reflected). The same applies to vegetation stands: plants „in full sap" with pronounced evapotranspiration tend to appear darker green, dried out grain or bushes more beige. A dried-out plant stand reduces evapotranspiration and soil heat flux, which often results in a lower radiation balance. The result is, for example, high temperatures in ripe grain stands.

This is somewhat more difficult in forests, which covers a third of Germany. Here, the stand (the treetops or the bushes) forms the „earth's surface". As a rule, we find forests in our cultivated landscape where farming is not profitable. This may be due to the orography (steep slopes, terrain edges), but also to the water supply (alluvial plains in river lowlands or on boggy ground on the one hand, pine forests on sandy ground on the other).

Whereas high evapotranspiration results in lower temperatures above wetlands, the situation is different for dry ground at tree-top height. Comparative measurements at the city of Freiburg above a lawn and in/above a pine forest with comparable subsoil showed that on the one hand the midday evaporation/flow of latent heat as well as the stock and soil heat flow did not show large differences, but on the other hand the flow of sensible heat did.

The peak value of the sensible heat flux over the pine forest was almost twice as large as that over the lawn. Accordingly, the midday temperatures at the upper edge of the tree canopy were higher than those above the lawn. The main factor for the greater warming was the higher value of radiation balance (15 %) resulting from the lower reflection of the pine forest surface (0.11 compared to 0.22. i.e. factor 2).

The reduced evapotranspiration of the pine forest compared to a grassland area was also observed in measurements in northern Germany. The ratio of sensible to latent heat flow, also called the „Bowen ratio", was 0.2, i.e. the flow of sensible heat was 5 times greater than that of latent heat. In a meadow, the ratio is more like 1.0, which is attributed to the pines' reduced transpiration capacity.

Under the influence of the wind, forests (and rivers alike) can also form break-off edges for heated air packets. Forests can therefore be sources of thermals themselves, but under the influence of wind they can also be the edges of the forest!

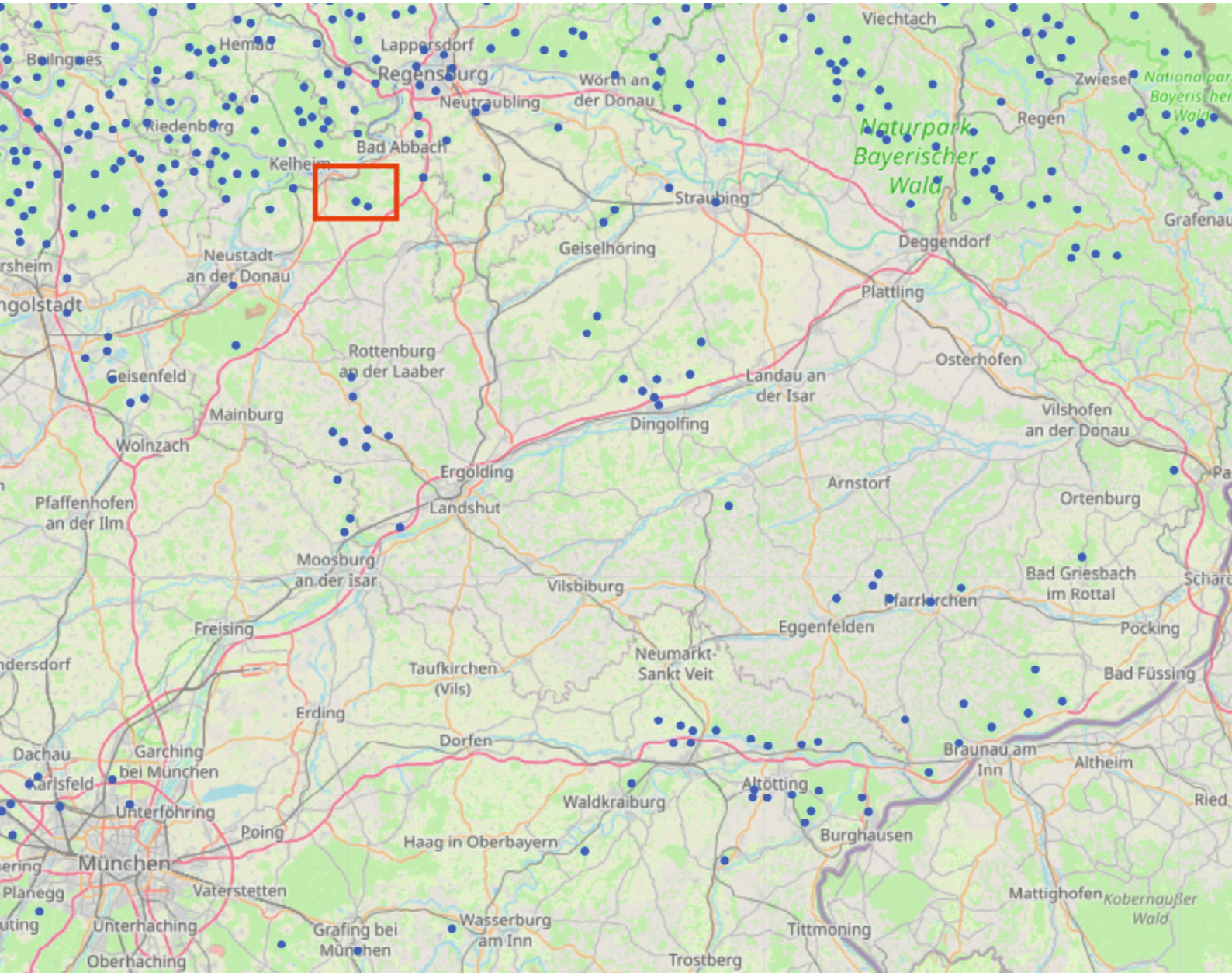
A summary of the considerations for windless days can be:
In the lowlands, look for thermals over dried areas (away from floodplains and wetlands) with no or with dried vegetation or pine forests; in weak winds look for trigger points like edges in the terrain, e. g. hills, forest edges or rivers on the downwind side.
In hilly country, search along break-away edges of sunny slopes or above forested sunny slopes.

Orographic structures are influencing the heating of the air near the ground in two directions: First, direct solar radiation increases on sun-exposed surfaces and second, the soil water content is reduced by runoff. In addition, the heated air can „creep up" the slope and thus inevitably encounters a departure edge!

To verify these derivations, one can refer to own experience in gliding or use the „Thermal Information Map" (www.thermalmap.info/thermalmap.php) by Tim and Richard Stuhler. The map generated here from OGN and IGC data from thousands of cross-country glider flights shows locations with frequent altitude gains due to thermal circling. The potential trigger point on the ground was determined on the basis of wind offset, inclination and altitude, and an algorithm was used to localise, bundle and weight areas of accumulation.

I picked out Lower Bavaria and the surrounding area, a region I feel at home when flying (***picture 3***).

The lower Bavarian hilly landscape is relatively homogeneous with a heavy, loamy soil (loess) on a substructure of marine and freshwater deposits, into which broader river valleys (glacial valleys) are embedded. Due to the fertility of the soil, large areas of the landscape are used for agriculture and



Picture 3 Hotspots according to the Thermal Information Map for the Lower Bavarian hill country based on OpenStreetMap

only 1/5 of the surface is covered with forests. After precipitation, the water tends to run off above ground. This region can only be classified as „thermally weak".

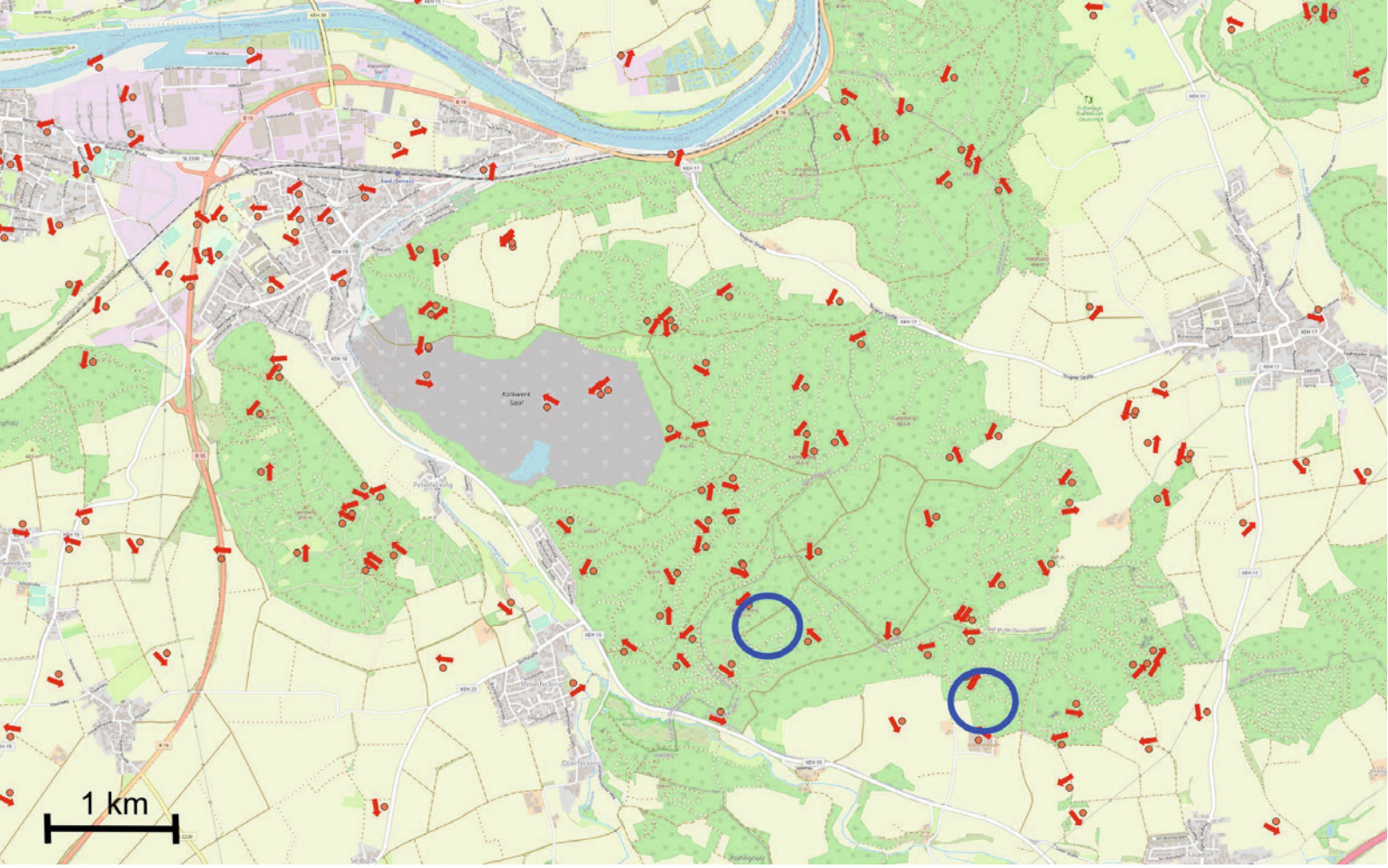
The Franconian Alb, a hilly plateau with deeply incised river valleys such as that of the Altmühl, borders to the north. The subsoil consists mainly of karstic limestone and dolomite with a thin layer of weathered clay and limestone fragments. Due to the limestone subsoil, precipitation drains underground through its crevices and fissures, which leads to a lack of water on the Alb. Accordingly, agricultural use is limited here and the proportion of forest is greater. This region is is „thermally rather good".

Even the first glance at the map (***picture 3***) shows two things:

- There are many more hotspots above the Alb than over the Lower Bavarian hills.
- With very few exceptions, the hotspots are located over the rather extensive forest areas.

The lack of hotspots over the lower Bavarian hills is probably mainly due to the fact that the region is thermally weak, and thus tends to be avoided by gliders.

A detailed examination of the hotspots over the lower Bavarian hills shows that they are either located on the northern flanks of the valleys



Picture 4 Calculated release points of better updrafts on low wind days near Saal an der Donau (Thermal Information Map)

above forests (wooded sunny hillside partly on the northern edge of the Inn and Isar valleys), above wide forest areas or in the valley area on terrain steps. Above the Alb, the hotspots are found above the more extensive forest areas. And not only on the wind-facing sides of the forest (break-away edge)!

As an example, I have chosen a forest area east-southeast of Kehlheim (***picture 4 and red marking in picture 3***). Tim Stuhler was kind enough to generate a section of the data showing the presumed trigger points of updrafts in light winds (less than 20 km/h), with at least 1.5 m/s climb, sufficient vertical extent and not too high thermal entry. On one hand, this reduces the number of upwinds shown, but on the other hand it makes a detailed view of individual upwind sources possible: the total amount of all recorded upwinds shows a close proximity of sources!

Actually, this is not very surprising in flat and hilly terrain: here only a part of the updraft sources is stationary, then flow dynamic effects, the place of origin, the lifetime and the interaction with the environment influence the structure, shape and position of an updraft (*see our part 4 of the article series „The thermal updraft – its structure and flow behaviour“*).

I think that every glider pilot knows one or two „house whiskers“ in his airfield environment, which are not always found in exactly the same place. That‘s why the Stuhlers‘ approach of bundling the calculated upwind sources is absolutely fine!

Another aspect that must be considered for a stronger updraft with sufficient vertical extent in stationary thermal sources is that the source has a sufficiently large catchment area of heated air in the ground-level over-adiabatic layer: this usually has to be a few square kilometres. Therefore, smaller quarries usually do not work as a reliable thermal source.

Back to picture 4: What is interesting about this area is that here – in addition to the forest area on a hilltop – there is also a quarry (on the western flank of the forest) and a somewhat larger village (Saal an der Donau). Two core points are marked on the hotspot map (marked with a blue circle in ***picture 4***). These are located on south-facing forest flanks. Here, the individual calculated trigger points do not show a clear wind direction (shown with a red arrow).

The majority of the individual trigger points above the forest area are located

near individual hilltops. Actually not quite unexpected: the vegetation above the flanks with a relatively low reflection heats up the most, and the over-adiabatic layer breaks up near a ridge. Some trigger points at the edge of the forest area also indicate detachment at the forest edge. Here the thesis is wonderfully confirmed: Always follow the forests!

Although it has an extension of two kilometres in an east-west direction, the quarry does not necessarily stand out as a preferred thermal source! As expected, however, the release points are also assigned to the south-facing flanks of the quarry.

The district of Obersaal is also assigned some upwind sources – also comprehensible. However, it is difficult to explain the causes of the individual thermal sources above the fields; in the end, many local and temporary effects play a role in causing the updrafts here.

Convection is a certain form of turbulence – and turbulence is characterised by a disorderly flow in the atmosphere, which is characterised by vortex formation and decay. However, theoretical knowledge of „convection" as well as experience gained on gliding flights may help to increase the probability of finding a single thermal updraft! ♦

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I'm stopping at RED, with GREEN I may go!

What every child already pays attention to in road traffic also helps us in the air...

...but as we know, things become more and more complex with increasing dimensions. Thus, despite FLARM and canopy flashers, obstacle databases and the most accurate GPS position, we still have far too many collisions – mostly with fatal outcomes.

AUTHORS: TINO JANKE AND FRANK DÖRNER

As can be seen in almost every article in this series, it is not uncommon that a simple ignoring can mean the beginning of a fatal ending Because if you don't know where to avoid, you can only get it right with luck.

Good old airspace observation is a great help in not getting too close to other aircraft, so as not to push your luck too far. It is not for nothing that „see and avoid" or „detect and avoid" is our main task in VFR flying.

FLARM helps as long as they all have it!

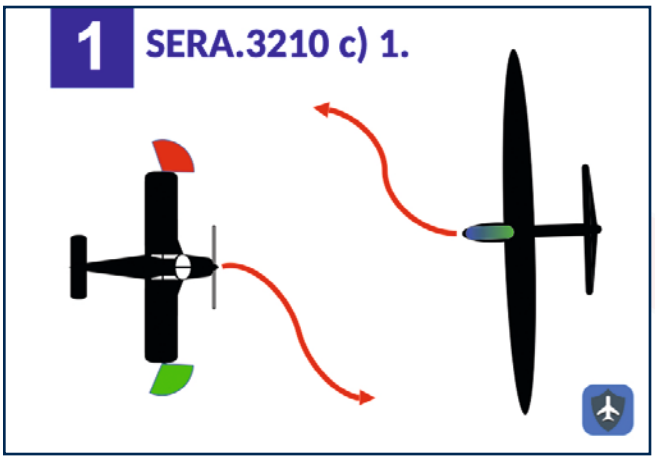
The three to four collisions with four to five fatalities per year in Germany prove that not everything is always above board. So let's take a closer look!

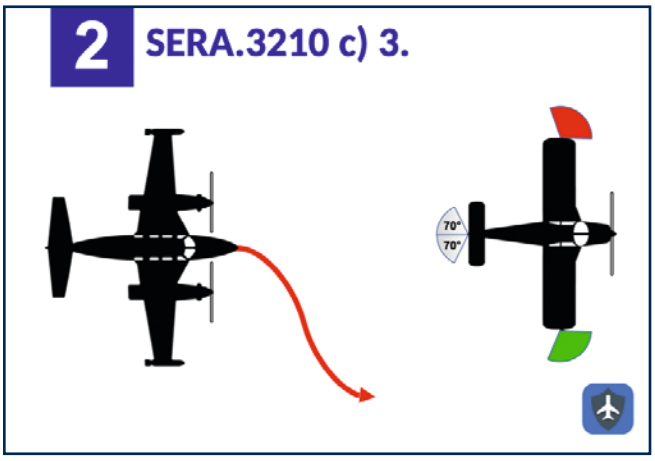
10 percent of the documented collisions take place among glider pilots during thermaling. Since nowadays (almost) all gliders are equipped with FLARM, we usually know very well that we are not alone in the updraft. In addition, more and more anti-collision lights are being used to attract our attention. And still,

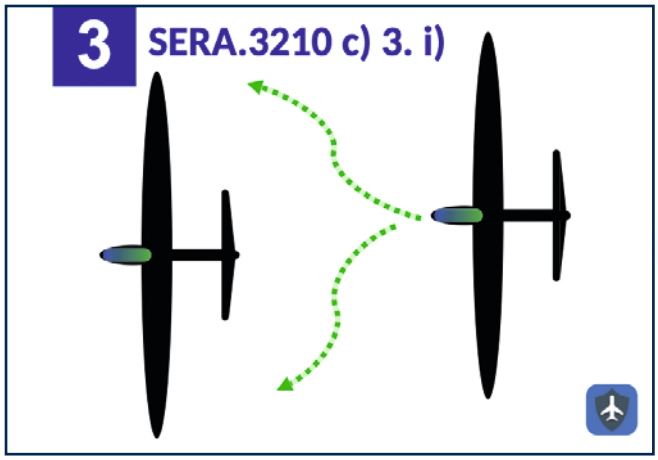
there are regular crashes.
In order to be able to live a „see and avoid“ attitude, it is essential to position oneself accordingly. Neither flying in a „blind spot“, nor an unexpected, extreme pull-up or an „inside pass“ avoids collisions. If you want to survive in the tightest of spaces, discipline and looking out are the only things that help.

20 percent of all collisions occur during cruise flight. Here we glider pilots are in good hands with our FLARM & Co – you might think. True, as long as all aircraft „speak the same language“. But since FLARM, for example, is not obligatory – and commercial aircraft do not even know this system – the safety offered is often deceptive. In cruising flight, too, „see and avoid“ coupled with the right distance from clouds is the best way to go. And if things get tight, it is important to observe the right-of-way rules in both cockpits.

As a glider pilot, one likes to invoke the rule that one acts according to the prescribed order of precedence (the more manoeuvrable aircraft must always avoid the less manoeuvrable one). But here, too, the devil lurks in the detail. If two aircraft are approaching each other, both must take evasive action to the right. It is completely irrelevant how manoeuvrable the aircraft are. In case of doubt, there is only little time left because of the approach speed. Therefore, both aircraft take evasive action - to the RIGHT! (***Picture 1***)







The evasive direction >RIGHT< is also maintained when overtaking. The position lights on motorised aircraft make it particularly easy for us. If we see white and are faster, we overtake RIGHT. The difference to road traffic here has the charming advantage that even in poor visibility we do not have to recognise whether it is oncoming traffic or traffic to be overtaken – we simply always swerve to the RIGHT (***Picture 2***)! Slightly more freely regulated for gliders by SERA. 3210 c) 3. i): „...A sailplane overtaking another sailplane may alter its course to the right or to the left.“ (***Picture 3***)

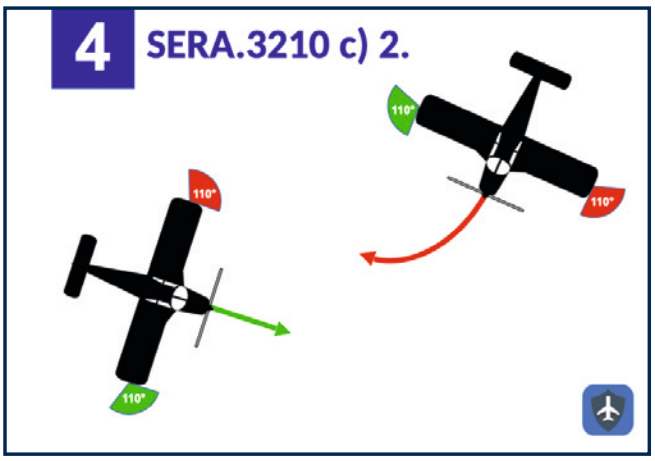
If we and our „conflicting traffic“ are equally manoeuvrable, the right of way is indicated by colours (***Picture 4***):

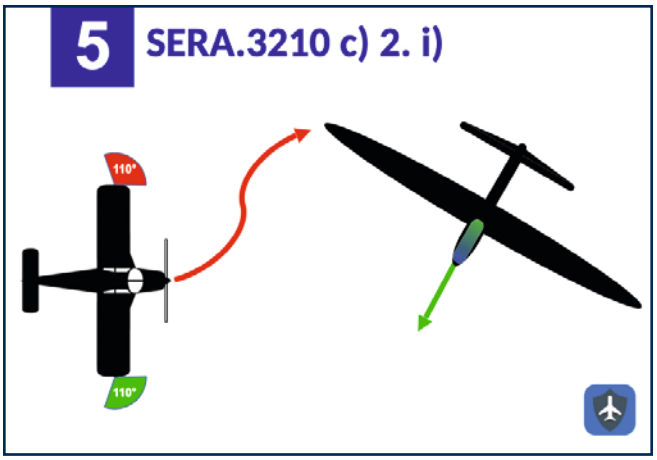
If I see a GREEN light on the other aircraft, I may FLY ON; if I see a RED light, I have to DODGE!

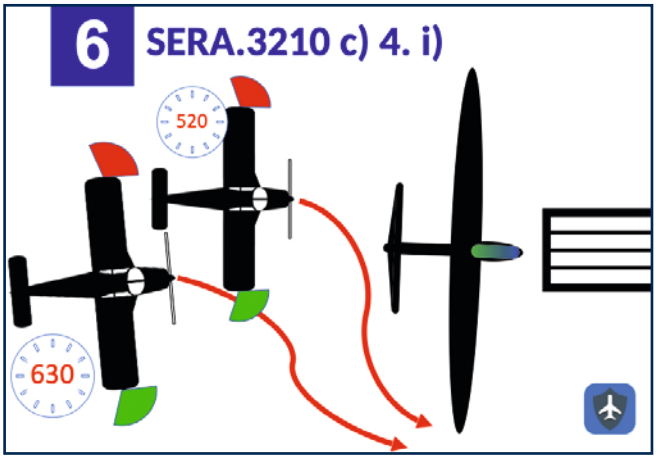
It always gets exciting when aircraft of different classes (with different agility) meet. Here, not only the aircraft itself has to be considered, but also whether the inherently manoeuvrable powered aircraft is towing something, for example. Powered aircraft must avoid a towing aircraft, which in turn must avoid an unpowered aircraft! Motor gliders with a stationary engine are considered gliders. Formally correct, this results in the following order of precedence in the right of way (***Picture 5***):
Powered aircraft heavier than air (most manoeuvrable) give way to:

- airships
- gliders, hang gliders and paragliders
- balloons (least manoeuvrable)

Different aircraft also meet in the aerodrome circuit – and unfortunately, in 40% of all collisions, they do so literally. Especially where powered and glider circuit meet, there are the most collisions! In addition to clear language and a variety of electronic aids, there are also clear rules in the aerodrome circuit. Aircraft on final approach or landing have priority, the lower flying one before the higher one. However, unpowered aircraft always have priority. (***Picture 6***) Here, too, the following should apply: „Being right and getting right are two different things“. If we cannot be sure whether the „other traffic“ has me in sight, I will take evasive action!







Special situations also require special rules – especially for us glider pilots: If, for example, two aircraft meet on a ridge, the „right wing on the ridge has the right of way“ – the glider with the left wing on the ridge must therefore take evasive action. In thermals, the first glider determines the direction of the turn, as far as is known. The fact that a slower climbing glider has to avoid a better performing one is often forgotten. Particularly when thermaling, careful cooperation – written down in the thermal flight rules – avoids being entered in the accident statistics. After all, 10 % of all collisions take place in the thermals! ♦

Our authors:

Tino Janke: Airlines and gliding clubs have more in common than you might think. Nevertheless, they both differ greatly when it comes to dealing with emergency procedures and checklists. Tino's idea is to combine the good from both. easymemoryitem.com

Frank Peter Dörner is a specialist lawyer for administrative law and has specialised in aviation law with his Munich law firm. In addition, Dörner is a glider pilot, powered aircraft pilot and UL pilot and trains as a flight instructor in all three disciplines. www.air-law.de

Glider camp Niederöblarn
from the very personal point of view of a beginner

Fearing the mountain

Get out of the comfort zone, into the adventure and fight the monster thoughts – Oh God, what am I doing? – that's the right attitude to have when you're a gliding novice heading for the mountains to ... no, not to learn to fear but to learn to fly.

Text and Pictures: Bernhard Strobl

Wing tip in front of Dachstein cable car mountain station

And then, during the gliding club Christmas party, the question suddenly arose: Where are we going for the gliding camp? Already a bit lulled to sleep after various resolutions and quorums (etc. yawn, blah, blah, blah), I was immediately wide awake: I've always wanted to join! Only my lack of experience actually forbade me to think about it, e.g. when I think of the landing approach in Turnau ("If you can touch the bell on the church tower with your hand, you're right"). But seriously: why not? So I took the initiative and voted for Niederöblarn (simply because I wanted to have more than just a handkerchief as a landing field). Even if I don't achieve any records, at least I've learned something; the area is great, I can safely fly somewhere and the colleagues are fun. It's still my own goals that I want to achieve.

But I have to say that I don't belong to the age group of pilots who can be given a stick and then it works. I've only had my licence for a few years and at the age of 60 I'm already allowed to have an annual medical. With 40 hours solo in the air, I'm not really experienced yet, but at least I've already reached the point where I've been thermally in the air three times for four and a half hours, and the landing was not a relief, but a necessary evil. I also often find myself analysing my flights on the logger: Well, if I got there from that altitude, then I can still achieve that from 500 m more ...

The author at his „home“ ‚Spitzerberg

So I was part of the party – which was also immediately joyfully received by my colleagues. In anticipation, they consulted Google Earth/Maps and familiarised themselves with the area. And suddenly there it was, this mean, sneaky monster called no-longer-in-the-comfort-zone. This is supposed to be a runway? It's no more than 15 metres wide, made of asphalt, with a mountain right next to it, and it's nowhere near as long as the one at Spitzerberg (author's note: the home airport). Oh God, oh God, how is that possible? Right away: It is possible, and easy too, but more on that later.

Learning takes place outside the comfort zone. But there are always two voices in the brain. The other one said, "Hey dude, hundreds of pilots land there every day, and so do the young ones who learned there, so don't make a drama out of it, take it slow and without pressure." Then you start to examine your old flights in terms of landing accuracy (if you haven't always taken part in the „landing competitions“ in the club anyway) and come to the conclusion: What's the problem? Just because it looks so small on GoogleEarth?

Of course, one also begins to think in a different direction: The Silver-C is already a desirable achievement (50 km distance, five hours duration, 1000 m altitude gain). If everything fits, you can think about it, it's really only to the Dachstein or to Liezen and back. No more monster thoughts, an attitude of expectation spreads that makes me want much more. When I left for Niederöblarn, my feelings were somewhere in the middle between IronMan and rabbit-before-the-snake.

I got to the flying centre faster and earlier, because I was solo in the car, while my colleagues were still on the road with the three glider trailers. Jürgen Moors is already there and sets up his camping bus. A little later the packed gliders and their drivers (Hannes Mühlfelder, Michael Baert and Otmar Kaufmann) show up. Later we are joined by Erwin Gugler, our motor glider flies by itself and arrives the next day with Walter Hartl. It's a pity that the days before were very rainy;

Neusiedlersee in the background

where the planes are rigged, we wade ankle-deep in water. So assembly is postponed for the time being. But the weather forecast is favourable, although a bit uncertain by the fact that there may be more thunderstorms. As a beginner, you don't yet understand that studying the weather is an indispensable part of preparing for a flight. What counts for me is the certainty of stable conditions and a high cloud base, as it is a super safety cushion. I register with satisfaction that this base will increase.

A little later the next day: All the planes are now set up and housed in the Niederöblarn hangar. Otmar gave me a lift in the motor glider and showed me around. It's nice to see that the distances are not huge either, the flight areas are easily explained. I've been pilot in control for the last half hour and drew three or four circles over a mountain ridge, which made me feel slightly queasy - the alpine huts aren't that far away. "If you can see what the hut host is cooking, you're too close and too low". It's still too early, the thermals don't take hold yet, we fly on. An unspectacular, unexciting landing gives me confidence. A familiarisation round is invaluable, as it gives you a feeling for the area and the procedures.

In Niederöblarn, you register with the operations manager before the launch. I give him a few clues about me: first flight at another site, first flight in the Alps, first tarmac runway, flying experience. Everybody has started once, so I get a detailed briefing, after which everything is clear to me.

The time has come, it's my turn, I want this now. I sit down in my aeroplane, a good-natured snooker, I feel comfortable in it. Erwin helps me get started, and the first shock: Why doesn't the tow plane understand me? Well, it helps a lot to have the right frequency set, as the plane was not yet in the air in LOGO. I should have set it. The excuse that I had fetched the operating manual weeks before to study exactly that doesn't count now. If it is my turn at the launch at the best time of day, I would have incurred the wrath of several pilots.

The team (left to right): Johannes Mühlfellner, Robert Terp, Erwin Gugler, Bernhard Strobl, Franz Liedl, Otmar Kaufmann

Erwin fetches Walter who quickly fixes the problem. Embarrassing. By the way: I will NEVER make this mistake again, everyone has to pay a lesson.
So, all is well, we are rolling incredibly smoothly, why did I have respect for the tarmac again? We are in the air, the tug pulls its turns good natured, but it is also calm conditions, where it gets jittery, he circles tighter – also no problem. What is he doing now? Otmar told me not to fly there! A little tension sets in when (it feels like) a ruined castle appears 20 metres away from me, which we circle. But the tension is soon gone when I realise how well I can fly behind it – it's kind of cool, just don't get cocky. I concentrate fully on the tow.
On we go, right past the sneaky monster into the mountains. I'm still safe, but at some point you're going to release, so think about when and where. The thermals aren't there yet – or I'm too insensitive to feel them at the moment, so I pull off at will. I do a few circles, sometimes here and sometimes there, nowhere does the variometer twitch. But what I learn is that between the ridges it goes down so much that I have to escape.

After 45 minutes the fun is over, I fly over to the other side of the valley, where it also goes down, so I land, it's not going to happen today. I announce my position at an uncomfortable 500 m above ground. Which is good, by the way, because it can sometimes happen that even gliders can get landing numbers: "Hold on - you're No. 2 behind the Arcus." Knowing that my plane has extremely effective landing flaps, I start the approach really high, very briefly this monster appears again, trying to persuade me: How are you going to hit this narrow strip? But actually everything happens automatically, after a few landings the IronMan reappears: that's fine. I roll, all smooth, what did the operations manager say? Quickly get away? Oh yes, hmmm, now I'm almost too slow, turn right and, almost at the taxiway, still get stuck between grass and asphalt. So I push off ten metres and that's it.
What a relief! All the pressure is now gone, the monster disappeared (at least hidden). Afterwards, everything is easier; my fear of "hitting" the runway is actually ridiculous, it's more about touching down so nicely on the centre strip and correcting so little with the rudder that no swerves are created. The landing pattern? All quite clear, information beforehand is important and essential, also listening on the radio, all this helps immensely. The flying? Nothing different than at home, only everything around is higher. But my next flight will be really interesting.
I can enjoy the evening. Michael and Otmar have pitched their tents next to Jürgen's small caravan. We have a barbecue. Otmar has done the shopping, Erwin made a delicious dish on the gril, Hannes delights us with a brew of apricots and

Let's go! Start into the mountain adventure on the „scary" asphalt runway

alcohol – it tastes delicious. In the meantime I learn that Michael, one of our pilots, forgot to extend the landing gear during the landing. Not a tragedy on grass, but rather unpleasant on asphalt. So unpleasant that the plane unfortunately has to go to the workshop, what the pilot concerned does himself with hanging head. To compensate he charters a plane from LOGO at his own expense, lets the others fly it and also gets his Silver C flight a few days later. The other pilots also have great successes, among others Jürgen succeeds his required 500, and the others also have fun in the air.

The best flying experience, however, only came to me on the fourth day. The weather is good, the base is somewhere at 2300 metres and my mood is excellent. So I get in the plane and depart. First of all: Niederöblarn reminds me of a motorway service station on the way to a holiday, and it's like that. My colleagues and I push the equipment into take-off position. That was also new to me, there are not two or three but 15 and sometimes more. The point is to get the best starting number, so to speak. If you're too early (in skiing that's called a pre-runner), you run the risk of drowning because nothing is happening thermally yet and also because the base will rise in the course of the day. If you are too late, you give away valuable "thermal time". At the beginning, no one wants to be the first, then later everyone wants to go up immediately. I'm somewhere in the middle, my launch preparation is good this time: checked the radio, smeared with sunscreen, filled the water bag, set up a small logger (hint: it can do metres and feet and both for site altitude and sea level). The tow is unspectacular, all professionals. I have my first climb and pull off, it's a good thing I was concentrated and remembered the ID of my tug (they have up to three tugs in operation at the same time). "28 - OE 5599 is gone, thank you".

Now a small rollercoaster ride begins, the differences between up and down are already enormous. Sometimes so much so that fastening your seatbelt tightly is not a recommendation, but a must. What now – I'm over a ridge, it's rising moderately, one half of the circle it's climbing, the other half it's sinking: Well, it's not going to work like that, concentrate – where's the crux of the matter (or the updraft)? After a few unsuccessful attempts at centering, I have to stop, the mountain is getting closer. Even if other planes are even lower, this is too tricky for me.
I change the side of the ridge, the same game but 300 m lower. What am I doing wrong? Again the ridge comes closer, so I go down even further, a bit more towards the middle of the valley (escape route home). Ah, now it works, hesitantly the vario settles at +2, it goes nicely upwards. I try to remember where it works now, obviously not on a ridge, but rather directly above

„The ridge walk“: View back over the Enns valley, from Stoderzinken to Grimming, in the valley the runway of Niederöblarn is visible

the top of the ridge - aha, for next time. I can make up 700 metres, the clouds are close. I think to myself, off to the next ridge.
Now I start calculating: How far away is it? Yesterday I had -5 there, how high will I get there? The airfield is ten kilometres away, my planning games on the logger tell me: you'll get home easily. On the other hand, maybe my monster will reappear behind the next ridge? It doesn't. I don't get there as low as I feared, but upwind is also lousy. How did I find it before? I search along the ridge and find another climb, but very narrow, I can't centre it. But what I notice is that every time I fly directly over the ridge, it has a light updraft. So why not just fly along the ridge?

The concept works. I fly along the ridge a few times and make good altitude again. I get braver: back to the last ridge (past the -5 monster) and see if I can repeat the game: unfortunately not. So I start looking for an updraft again – below me is some kind of valley basin, where several valleys converge, it works, aha, so something like that is also possible – very interesting.
Back on top, with new courage, I look for the next mountain. And there I find updraft again, it takes longer than I had hoped, but now it's going up at +5 and it doesn't look like it's going to stop any time soon. You have to circle tighter to take advantage of these updrafts. I hit the thermal perfectly, I'm directly under the clouds, I can't go higher than 2600, there was still something with minimum distance to the top. And the fact that the base is now at 2600 instead of 2300 is also new to me. I have time to take a longer look outside: Now it's here, the moment of absolute well-being, the IronMan, I can't see any monsters far and wide, but the mountains behind Grimming. Gröbming is just down there, I can already see Schladming and I'm looking at the Dachstein massif, I want to go there – but not today.
My preparation for flying with sunscreen was well-intentioned, but when it gets in my eyes, it burns and impairs my vision. I also notice that the parachute doesn't really fit properly: I sit half on the chute, after three hours it becomes unbearable. No chance to fix it in the cockpit.

On the radio I hear „...wetr4ere@ ... krrk ... you're supposed to land, not fly". Was that meant for me? Should I let the others fly too? I make a compromise and change the side of the valley, closer to the airfield. A mistake. There is absolutely no updraft to be found, so I make the best of the situation: I look at the Grimming, enjoy the area, make gentle circles with a delayed descent and position myself for landing. The LOGO operations manager asks me how high I am, another glider wants to land too, funny – it's my club mates in the Duo Discus (Walter with a guest). I get to go first and choose the direction. I take 04, I know it already. The landing isn't great, with a mini hop of just a few metres, and I come to a stop almost outside the asphalt again. Cool, that's how you want it. I get to the table where my colleagues are sitting, my grin gives it all away, the others just smile. I don't need a debriefing, you can only „experience" it. These are my very personal impressions, and the colleagues who are flying 500 and 1000 on this day are happy with me. I'm still at the very beginning, there's still a lot more in it. The monster is locked up somewhere, it's still there, but it doesn't hinder my desire to try more.

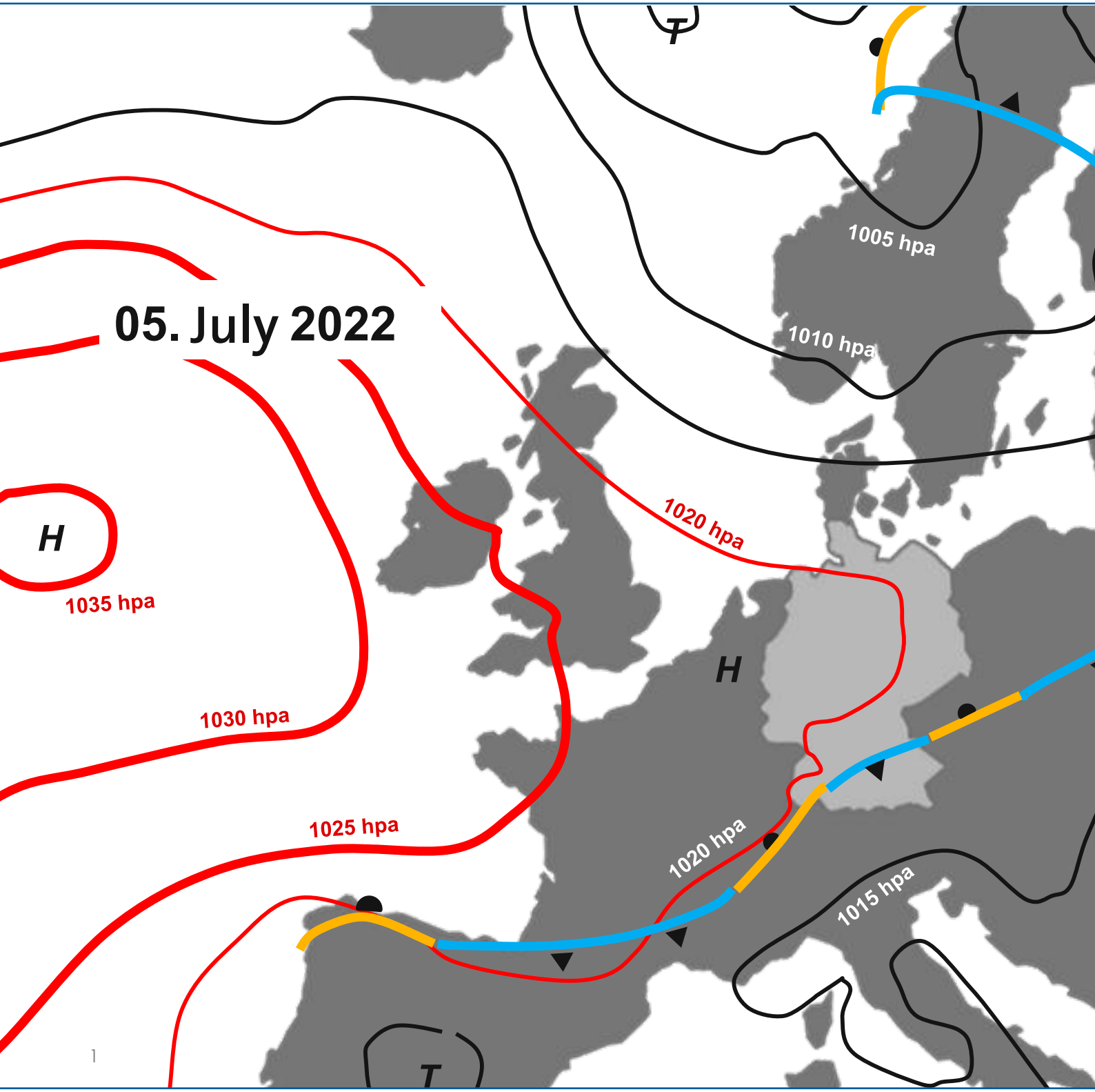
My job doesn't allow me to get more involved with flying at the moment, eight flights a year just allows me to maintain skills and only slowly expand. Nevertheless: I learned a lot, had great experiences, broadened my horizons, had fun, recharged my batteries. That's positive stress: I haven't thought about anything but flying for a single second during any of my flights, it's demanding but immensely satisfying.
Oh yes, Jürgen takes me along in the DUO, he wants to show me a little bit. I happily accept the offer. Essentially, he does the same as I do, only more precise, more targeted, technically better with slightly better flying equipment – more yield, so to speak. Wouldn't have made me sick then we would have made it to the Brenner Pass – so we turn back.. As it turns out, a nasty stomach virus confines me to bed for the next two days. The weather gets even better, unfortunately I don't get anything out of it – no matter, I'm happy.

I have to make a few small remarks about the LOGO organisation: The hangar there has to accommodate many more aircraft than we do at Spitzerberg. Well, in LOGO the people are permanently employed, but the precision of the commands is unique. It's not, for example, „Well, over there, straight to the other", but: „Right wingtip stop, left wing towards the nose of the aircraft under the Cirrus". Also at the start, around 11 o'clock, the person responsible for the launch is highly concentrated, you notices that, consideration is given, you say only what is necessary. At the call: „I need five to six people, we have a landing without gear" five to six people also jump up, that's normal. Keeping to the rules there is not a recommendation, it's a must, because these are all safety-critical things.
This is not the time to talk about helping out, camaraderie, fun, damaged planes, unfair weather, occasionally loud words, hectic, flight tactical highlights, achievements, shop talk, super nice helpful German colleagues with noble aircraft or ego pigs. But there are individuals who do more than the bare minimum and do it with enthusiasm and love for the

sport. Without such people it would not work - thank you. Everyone has to decide for himslef how he feels within the community. I have moved, hangared, assembled or disassembled more aircraft than I have used; I think that fits and applies to the others as well.

It was super nice, too short for me and if my time permits, I definitely want to repeat it. Niederöblarn remains in my best memory. ♦

Weather condit



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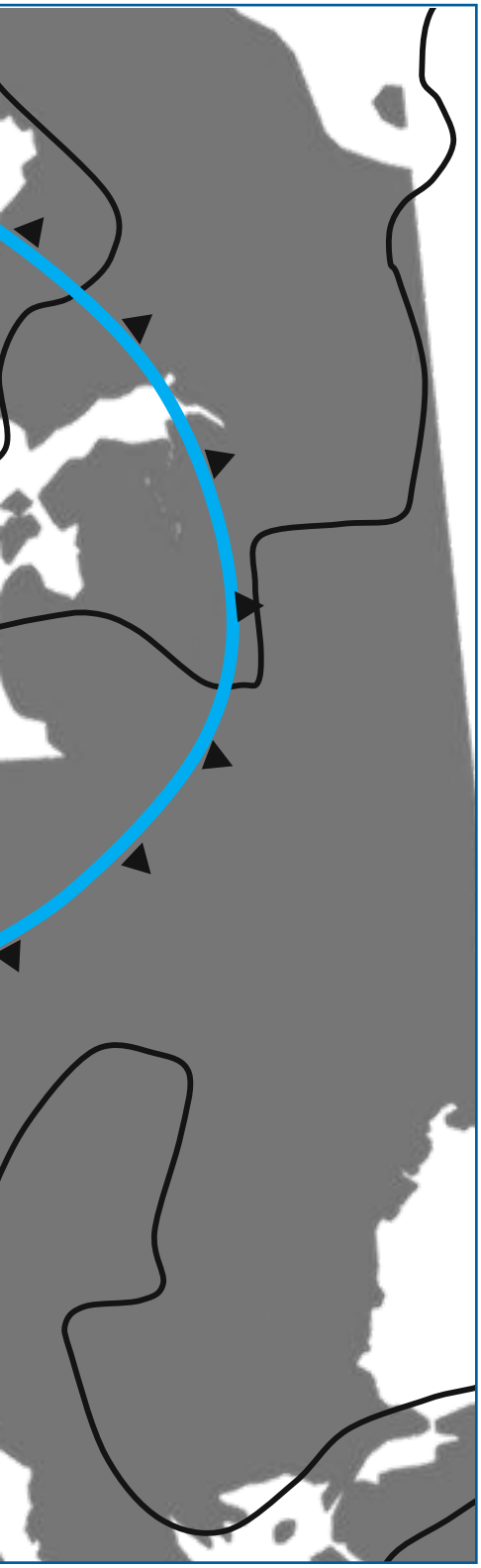
tions, that made history



Tuesday 05 July 2022

Actually, it is not weather situations but pilots who write history. On this day, it was Alexander Müller who secured a place in the „Hall of Fame“ with the longest distance flown within Germany to date.

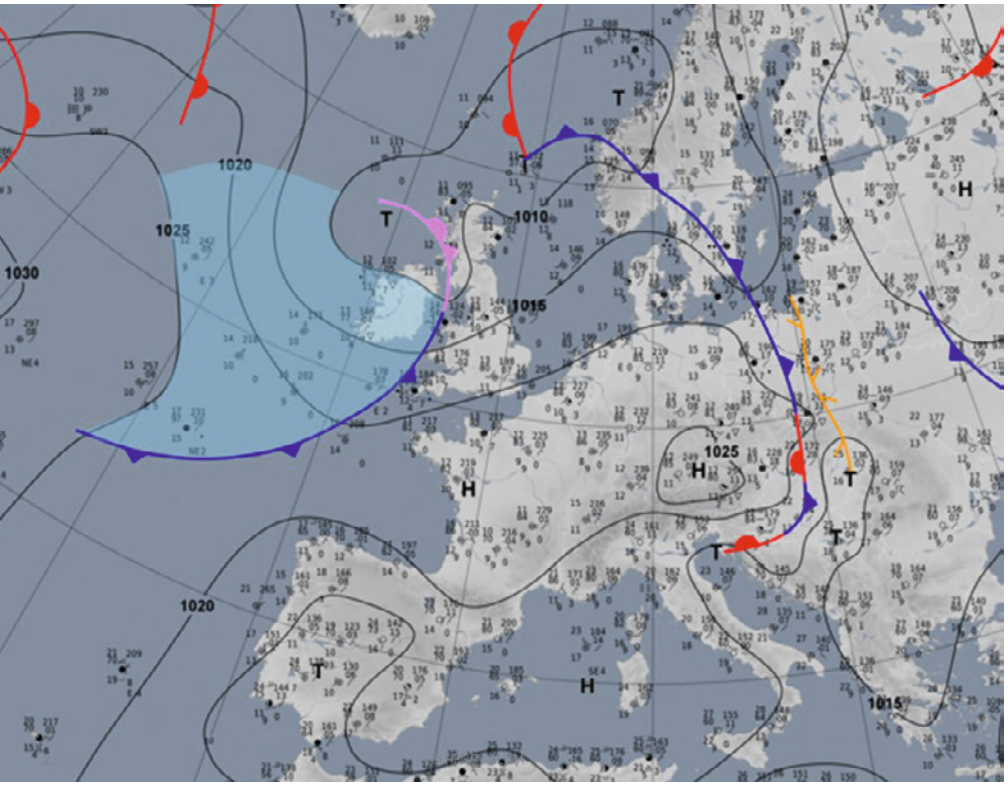
Text: Henry Blum, Pictures: DWD, Zoom EARTH, NASA/GSFC/EOSDIS, AquaMODIS, Online-Contest.org, WeGlide.org, University of Wyoming, Henry Blum

At the end of the day, 1421.65 kilometres were recorded. A flight purely in thermals, which, measured in kilometres, had only been surpassed by Hans Werner Grosse on April 25,1972, when he flew over 1460 km from Lübeck to Biarritz on the French Atlantic coast.

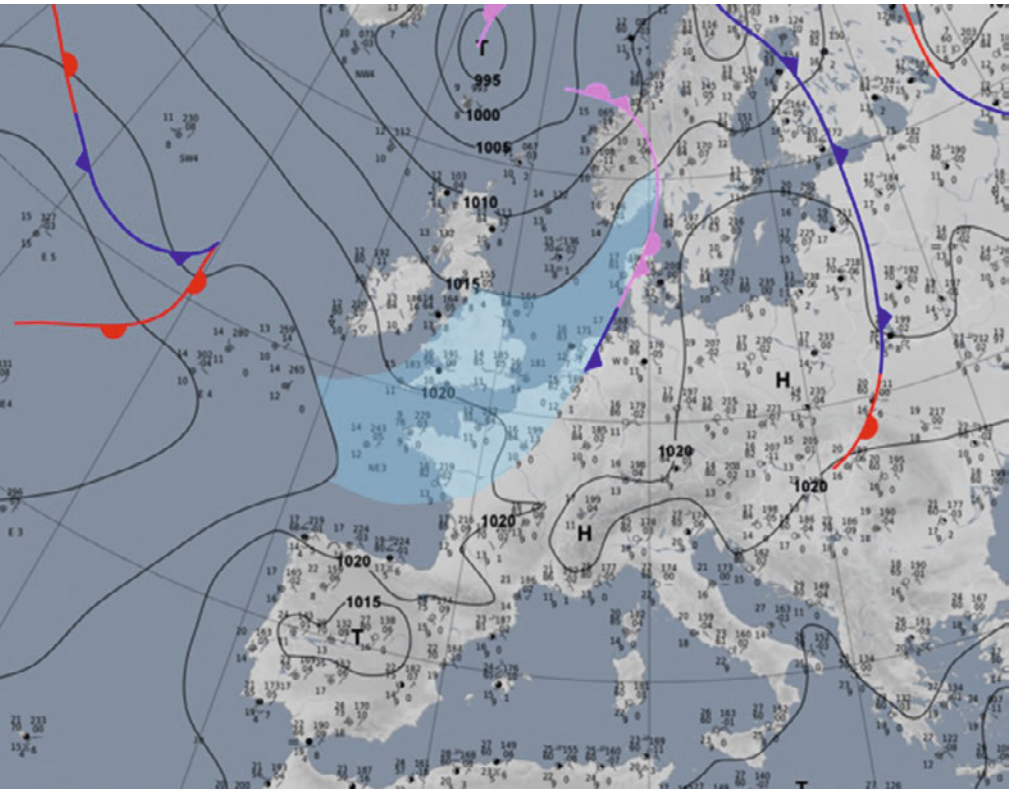
Another seventeen pilots uploaded files with four-digit distances in the OLC on that day, including Noah Daniel Neumeier with a DuoDiscus XLT.

The start of a series

Tuesday, July 05, 2022 was the highlight within a series of good days. Already on July 2nd, the weather carried nine pilots over the magic threshold of 1000 kilometers, including Michael Ebel, Rene Hanses and Bernd Goretzki. So it is worthwhile to take a closer look at the synoptic development. The weather situation on Saturday, on July 2nd, (***picture 1 next page***) shows an almost ideal cross country situation, especially in the northern half of Germany. Cold



Picture 1 Weather map from Saturday, July 2nd 2022



Picture 2 Weather map from Sunday, July 3rd, 2022. Notice the frontal system mentioned by Wilfried Großkinsky

air has flown in and gets under the influence of rising pressure. Hardly any of the pilots suspected, that behind the cold front on the Atlantic, the air mass was approaching, that was to cause quite a furor three days later (***marked blue in the picture***). On Sunday, July 3rd, there was still good gliding weather. At least two pilots managed four-digit distances, Jan Rothhardt and Tore Graeber.

Wilfried Großkinsky also flew fast from the Dahlem Binz and later commented on his experience with the weather in the OLC: "Gigantic start in the Eifel, with a base over 2000 m. Excellent climb rates and lines OW. Unfortunately, the front came from NW earlier than planned". What he meant was the weak cold front behind which the new air mass slowly pushed into Central Europe (***picture 2***).

Monday, July 4th, also brought flyable weather (***picture 3***).

The cold front crossed Germany during the night and on its backside higher air pressure gradually built up.

All good things come in threes

Monday was not flawless either, but it was good enough for Carsten Freyer from LSV Burgdorf and Max Maslak (AC Bonn-Hangelar) to achieve a four-figure result again. Max commented on his third thousand km flight in the 2022 season with somewhat mixed feelings as follows: "Why not? All good things come in threes. I will be able to talk about this flight for a long time, not because the weather was so great, but it was my longest flight, my slowest thousand km distance and the latest landing.

Today was a really slow day, I often missed many lifts and was really frus-

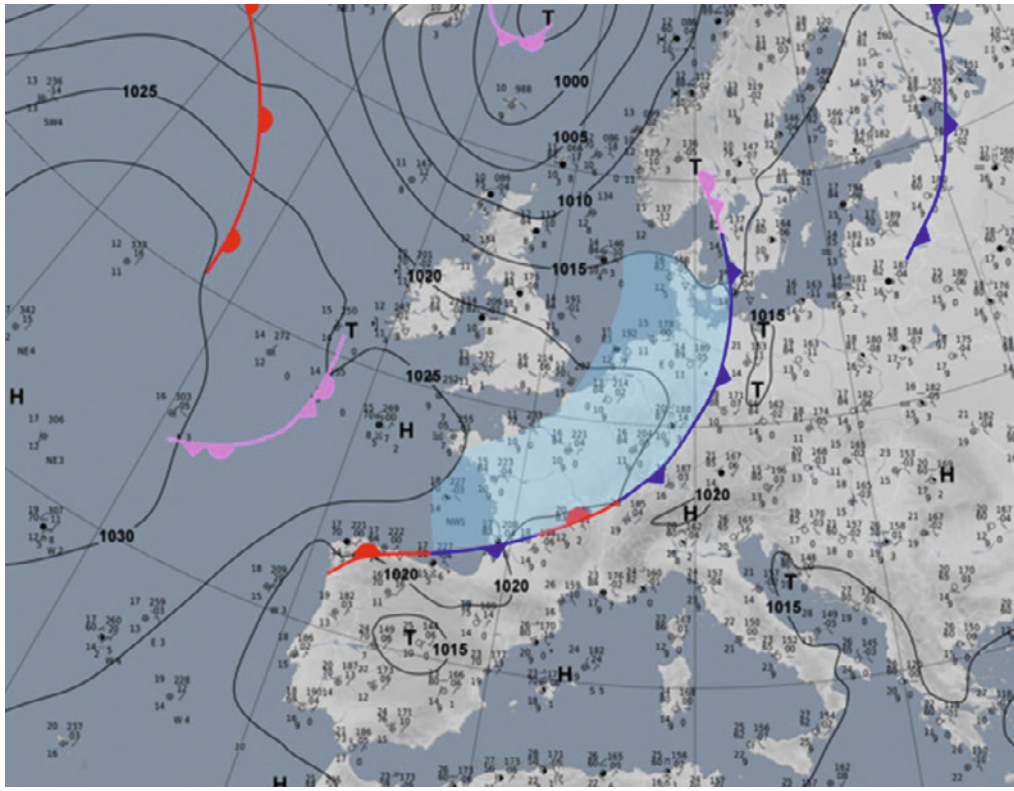
trated in between. Since my first turnpoint was completely in the blue, I didn't manage to get to it either and aborted my task. The Rhine crossing with almost no cloud cover didn't go any better. At least the Eifel and the Sauerland were quite well developed. But the power stations went really well today! Slowly I am building up a certain love". The satellite image of July 4th (***picture 4***) afternoon shows: The weak cold front runs roughly along the dash-dotted line from southwest to northeast. On the back side, especially in the north and north-east, there are already good gliding conditions.

Not quite a typical weather pattern

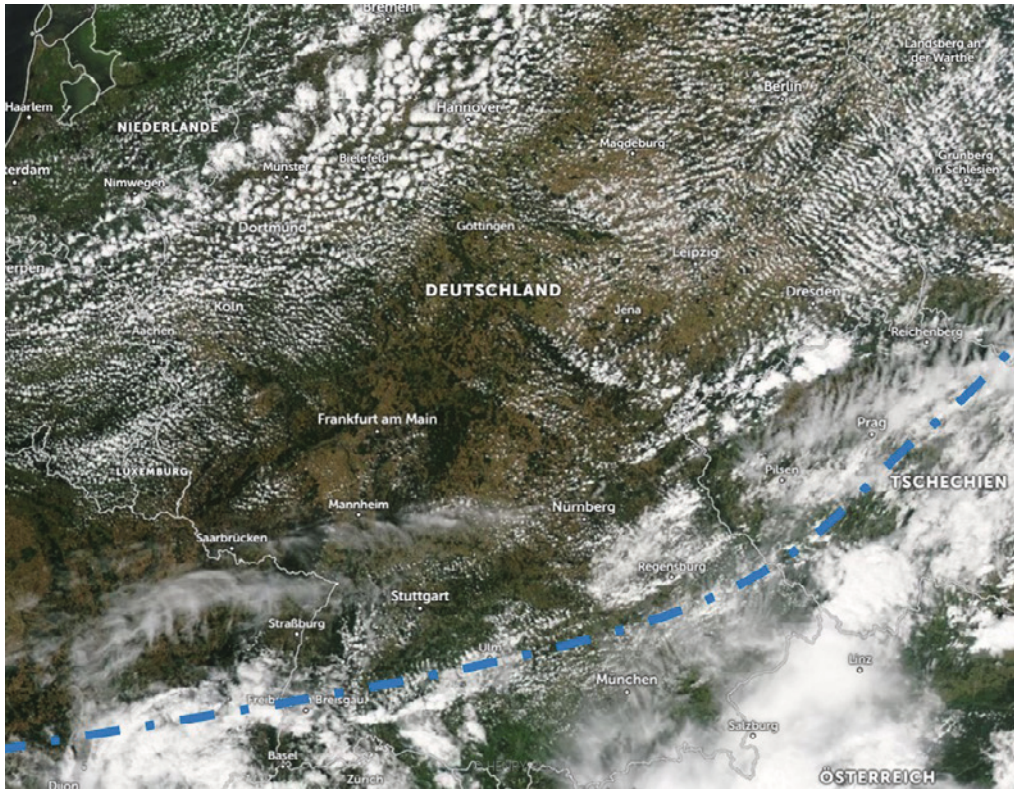
First of all, July 5th, resembles the "classic pattern" for excellent gliding weather in spring. Most of the time it allows for an early take-off: Maritime air of polar (better still arctic) origin flows towards Central Europe, where it gradually gets under the influence of high pressure. The sinking air in the high warms the higher layers of the atmosphere.

At the lower limit of the sinking process, an inversion develops, that reliably prevents overdevelopment. At the same time, the warming associated with the descent of the air lets the high cloud cover dissipate by drying. Unhindered radiation is the result. In the cold air, good to very good thermals can develop early on.

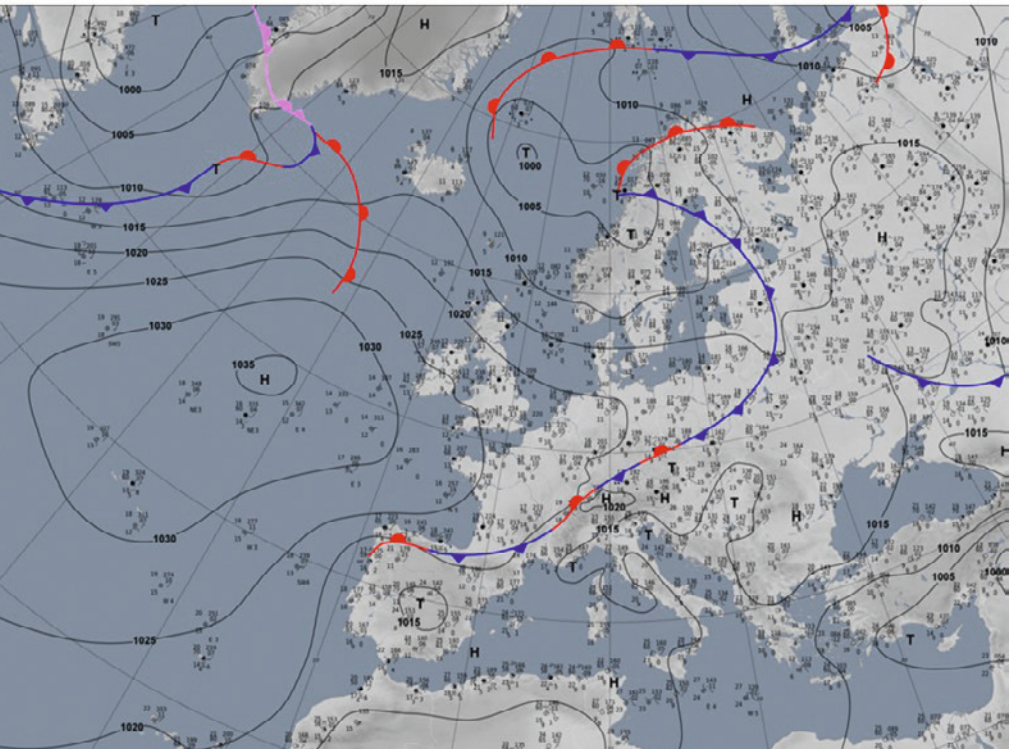
July 5 didn't look quite like a "pattern" though: The weather situation on the weather map of the German Weather Service hardly changed compared to that of July 4th. The high ridge extended a little to the east. And unlike April and May, seasons in which morning temperatures can be close to freezing, this



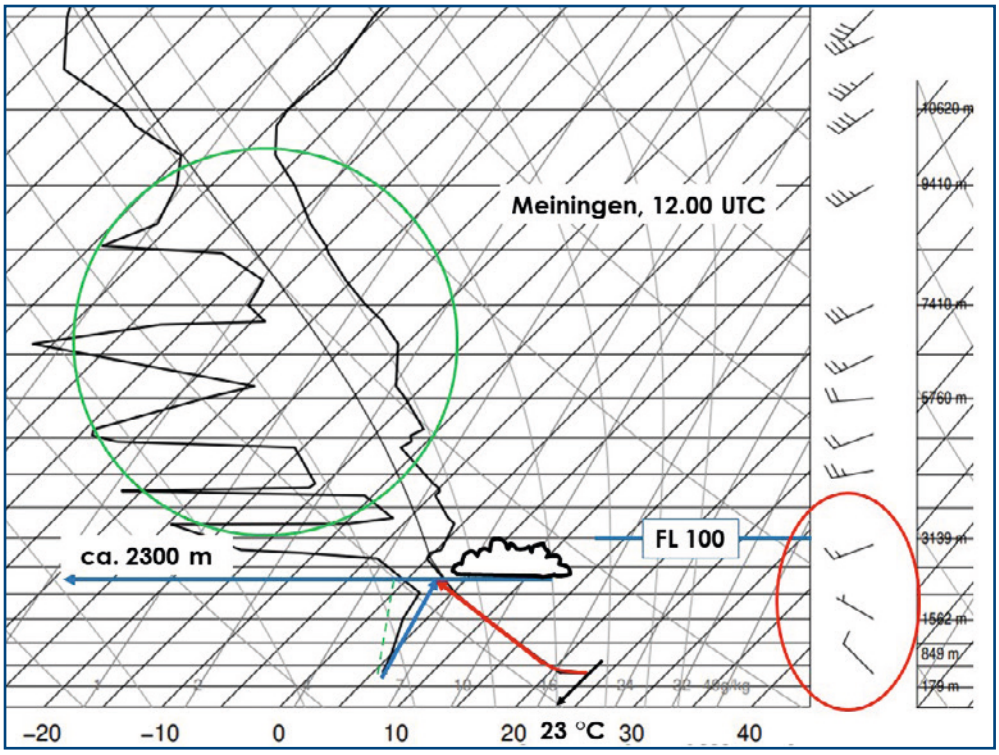
Picture 3 Weather map of Monday July 4th 2022, 00:00 UTC



Picture 4 Satellite image from July 4th afternoon



Picture 5 Weather map on the 5th of July 2022, 00:00 UTC.
Only slight differences compared to the previous day



Picture 6 The forecast SkewT of Meiningen (south-west of Eisenach)
on the 5th of July 2022 at 12.00 UTC

time there was some ground frost only in high-altitude areas. This time, it was more due to a morning ground inversion. Otherwise, the morning temperatures were already in the double-digit range (***picture 5***). Let's try a forecast based on the data already available on the morning of the day: The calculated SkewT for Meiningen (***picture 6***) for 12:00 UTC suggests a base of about 2300 m around noon. With daily maximum temperatures of 26 - 28 °C, even cloud bases just below 3000 m would be conceivable later.

In addition, there is a clearly visible backing of the wind with altitude, which suggests a continuing supply of cold air. The thermals would therefore last for a long time. Sufficient drying caused by the sinking of the air at altitude (circled here in green) should prevent cirrus shields and allow for unrestricted insolation. The only downer, the morning temperatures (not shown here) are more like 15 °C, rather than near freezing levels. This would delay the start of thermals till a little later.

On the other hand, in July the sun rises earlier than in May or even April and it is also much higher in the sky. In addition, the day is much longer. All these factors compensate for the disadvantage of higher trigger temperatures. So, in the center of Germany, in the area of the core of the high pressure ridge, mostly good to very good thermals could be expected. Only further north and south it would become more difficult.

In the north because of the influence of the low pressure and the cyclonal curved isobars. Overdevelopments could occur there. In the south, too, closer to the relatively stationary front. All in all, a good day, but unfortunately

not large-scale enough to make it a record situation. At least, that's what I would have thought.

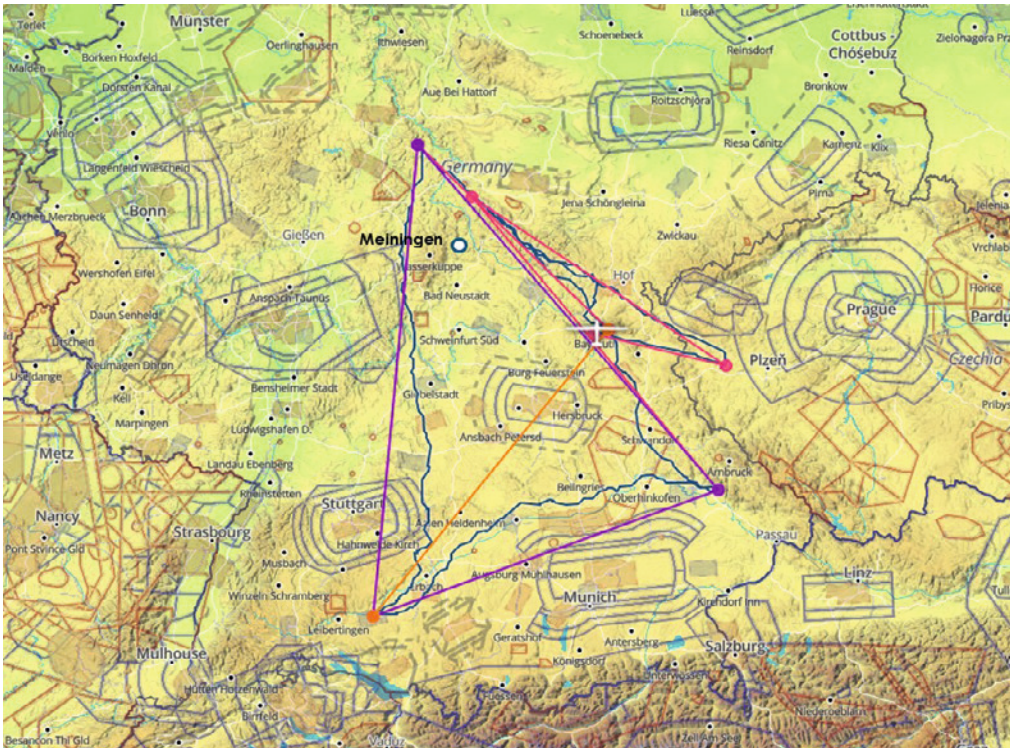
You can be so wrong!

In retrospect, it's fascinating to see how the weather developed. Great pictures of the day can be found at WeGlide and the OLC. And not only the distance yield of many pilots is impressive, but in particular the 1400 km flight of Alexander Müller (***picture 7***).

Joshua Rieger from the WeGlide team interviewed Alexander in November and published the interview under the following link: magazine.weglide.org/1400km-im-segelflug-alexander-mueller/

Very interesting and worth reading, especially against the background of this day, whose weather is mainly discussed in this article. While reading it, I kept thinking of a statement by Ingo Andreesen, who once summed up the secret of successful cross-country flying as follows:

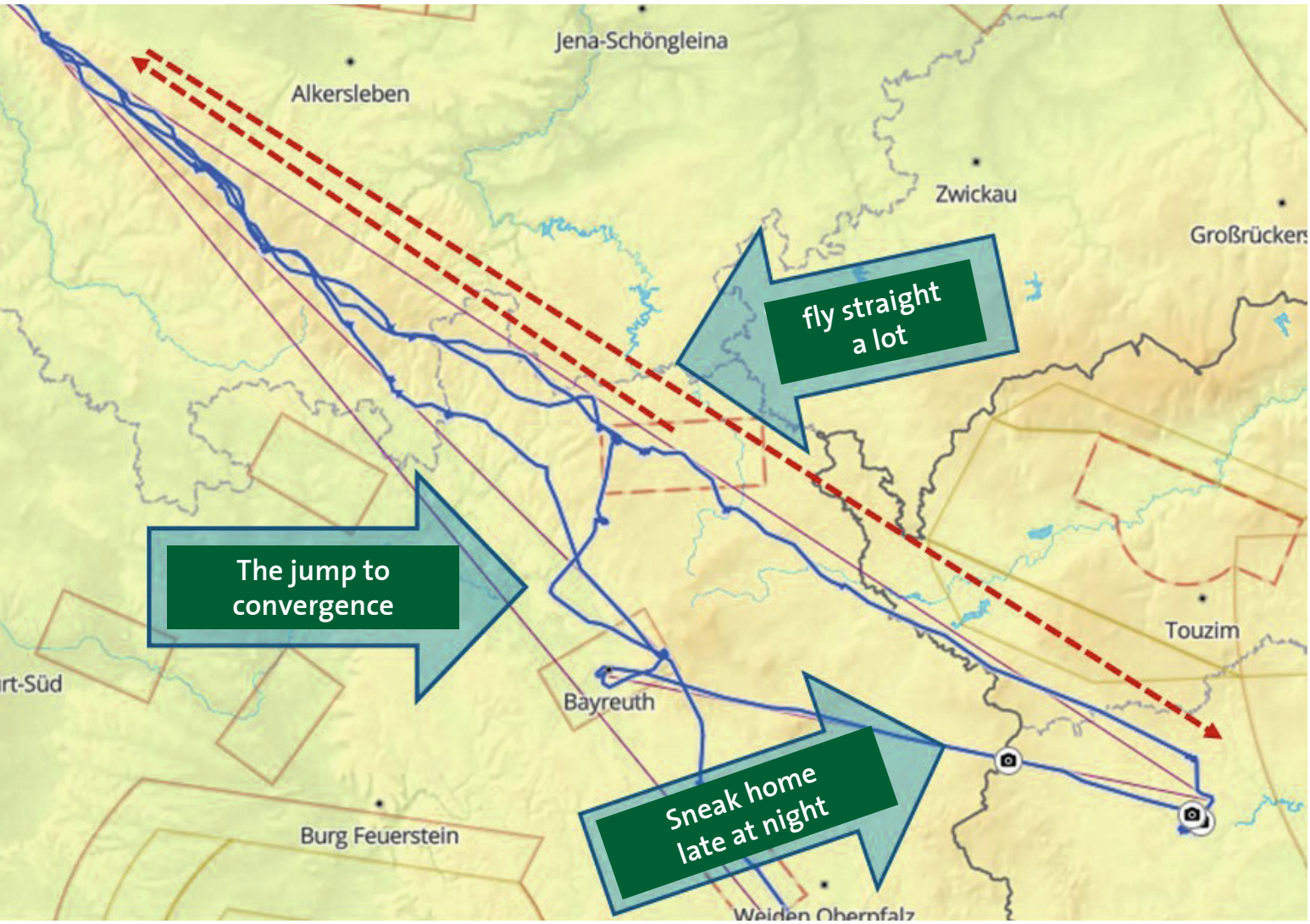
- recognize the weather
- start early
- fly straight ahead a lot
- only take the stronger updrafts
- sneak home late in the evening, and
- be lucky



Picture 7 The flight path of Alexander Müller during his flight over 1421 kilometres

All these factors can be excellently demonstrated by Alexander's flight and his answers in the interview with Joshua: We have already talked at length about point one, recognizing the weather.

So let's move on to point two, the early take off: Alexander Müller describes very nicely when and how he already takes off at the first visible fluff and why



Picture 8 High proportion of straight flight legs under a convergence line. Finally, the final approach to Bayreuth

he finds the first updrafts at the Ochsenkopf in the Fichtelgebirge.

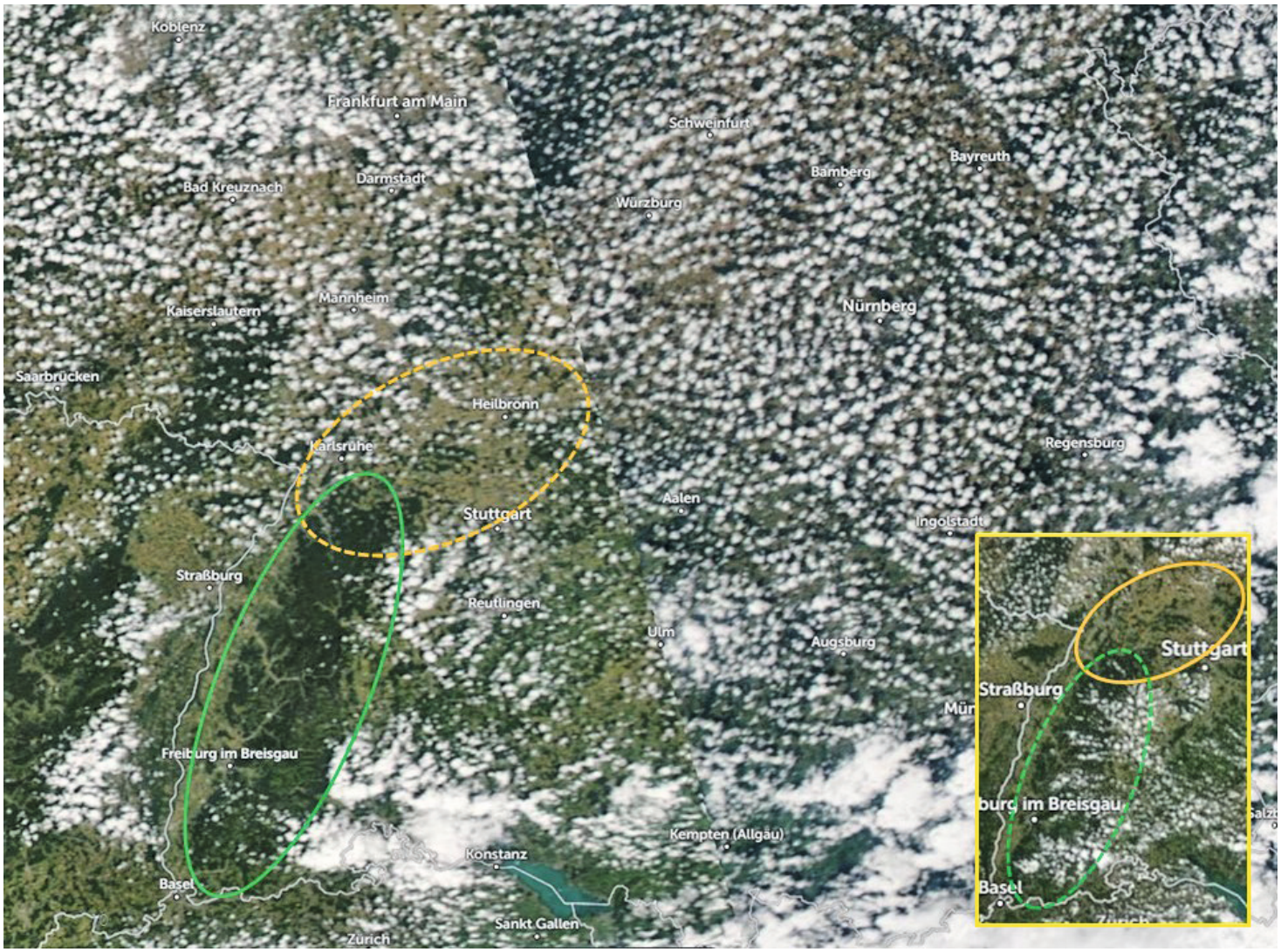
Point three, flying straight, without too many circles, he practices especially on leg number four and five, when he realizes that a convergence continues from the Thuringian Forest far into the Czech Republic. This line allows fast flying with a 172 km/h average speed over 142 kilometers without circling. Point four, taking only the stronger updrafts, is actually self-explanatory. His flight and interview with Joshua also provide interesting evidence for this.

Finally, point five, sneaking home, also fits the mold. He defines the last turn point, so that he can finish his final approach to Bayreuth at sunset (***picture 8***).

Point six, you have to be lucky. Luck, too, is by no means as accidental as one might think. It has a lot to do with the quality of decisions and their consistent implementation. Alexander sees it that way too.

In the above-mentioned conversation with Joshua, for example, he reports how he decided to fly east of Stuttgart instead of using the usual route over the Black Forest. Using the top meteo forecast maps, he knew it was supposed to be blue in the far southwest.

In fact, the Black Forest was initially well developed (see also small section of the satellite image from the morning in picture 9). However, it would have been difficult to enter it via the Kraichgau (northwest of Stuttgart, outlined in orange here).



Picture 9 Satellite image from the afternoon, enhanced with a small section of the Black Forest from the morning. In the northeast of Bayreuth, one can see the first signs of the convergence that will develop later

In the early afternoon, on the other hand, the Black Forest dried up almost completely as predicted (picture 9). Now the Kraichgau developed. And the Swabian Alb showed clear overdevelopments in the southwest also, which might have been accompanied by showers. So the flight path along the usual circuit would have delayed the flight considerably. It may have even made it impossible.

Another decision, that proved to be the key to success, was to jump off the course towards Bayreuth on the third leg. Alexander had received a tip from a fellow club member that there was a convergence north of Hof. Since he still had enough altitude, he promptly turned sharply to the north. He reached the supporting line without any problems with a short intermediate lift. Here he found the strongest updraft of the day, or as Alexander puts it, "like a ride on a rocket. On the clocks partly with more than 6 m/s". The rest of the legs three, four and five he completed "in a stretched line" as mentioned above.

When everything fits

So in the end, everything was right for a piece of gliding history: a good air mass, a halfway ideal pressure situation and an optimal length of the day with unobstructed radiation.

Add to that mix an excellent pilot and an EB 29, the best open class glider on the market. This completed the recipe for a record flight that will probably last for a long time. ♦

High up: Flying safely in the ALPS

Part 4: The Cruising Speed Tactic

Text: Mathias Schunk, Pictures: Mathias Schunk, Sebastian Nägel

After we dealt with the planning of flights in the Alpine region in the last issue, this time we are talking about basic tactics in cruising speed.

The cruising speed in the mountains differs considerably from that in the flatland. It is now known that the McCready theory does not represent the optimum in the flatland either, because this theory assumes that the aircraft should always already have the corresponding speed at the respective sink rate. This is impossible, however, because the pilot can only ever react, but never knows the exact air mass movement to be encountered in advance, so he is always lagging behind.

In addition, the McCready theory completely neglects the transition losses due to large and small g-loads (acceleration values greater and less than + 1 g). That is why it has now become established on the plain to fly a speed that approximates the McCready speed-to-fly. Soft dolphin flight is required, without large g-loads.

On dolphin flight and the relationship between load factor, lift coefficient and drag coefficient, Helmut Reichmann writes: "Fly with a high load factor in ascending air, and with a low load factor in descending air."

The speed-to-fly theory

In contrast to flatland flying, the deviation from the speed-to-fly theory is even greater in mountain gliding. Basically, in the mountains you should always try to arrive above the next breakaway edge, preferably above the highest ridge. If you manage to do this, the theory "final climb of the abandoned upwind is equal to initial climb of the next upwind", which applies in principle on the flat as well as in the mountains, will be easier to put into practice than if you arrive below the ridge. However, in order to arrive above the breakaway edge, it is often necessary to fly much slower than the approximate speed-to-fly would dictate. The loss of time due to the lower cruising speed is usually more than compensated for by the better initial climb over the ridge. Making the right choice here is the art of mountain soaring.

The cruising speed in the mountains tends to be lower than in the flatland with comparable thermals, because the risk of losing a lot of time under ridge, especially when flying perpendicular to the ridges, is otherwise too high. However, the loss in case of a speed that is too slow (compared to the theoretically

optimal forward speed) is relatively low even in the theoretical range without the special mountain influence. This has also been mathematically proven by Helmut Reichmann.

Correct use of on-board computers

Very helpful for choosing the correct forward speed are databases with known release points and their minimum arrival altitudes, which can be displayed with the help of the on-board computers and quasi final approaches can be made to them. The longer the glide path, e.g. for valley crossings, the more helpful such information is, especially for long approaches to passes to be crossed. You can either determine these points yourself empirically on the basis of your own flights and those of others, or you can create them with the help of modern evaluation programmes and their vector maps.

I myself have created a route for myself over all the points that are repeatedly approached during our standard routes. As soon as I can safely approach a thermal or pass, I switch to the next waypoint in order to already be aware of the altitude situation to this one. Already after the departure from Könnigsdorf I have the first thermal on the Hirschberg or the Risserkogel in the computer. As soon as this thermal is centred, I switch further to the Wilder Kaiser, whose west side I don't want to reach below 1600 m MSL. This way, you are mentally attuned to crucial parts of the flight quite early on and know whether you still need to exploit a weak thermal or whether you are already high enough to continue flying. This route continues along our standard take-off via Wallerberg, Glemmtal, Hundstein until crossing the main Alpine ridge. The advantage of this approach is that one is very quickly aware of how to proceed and does not simply leave it to chance or a rough, emotional estimate of whether one will arrive above or below the edge of the slope or pass.

Risk-reward balancing

An important point in mountain gliding is flying with foresight: You must have an alternative at all times in case the hoped-for updraft is not found at the imagined location. At low altitudes, this concerns the accessibility of a suitable landing field, which can often be many kilometres away. At

Examples of risk-reward trade-off

Picture above: Crossing from the Nordkette to the Kellerjoch:
Here you have to minimise the risk and try to arrive as high as possible, because at Kellerjoch you only approach a single mountain where you have to find an updraft if you arrive too low. If you arrive a little higher by flying slowly ahead, you still have the chance, if you don‘t find the thermal, to make the traverse to Märzengrund and still arrive there at a sufficient altitude.

Picture below: Crossing in the opposite direction from Kellerjoch to Nordkette:
Here you can choose a higher risk, fly faster and arrive lower, because after arriving at the Nordkette you fly along a long mountain range illuminated by the sun and will hit the release point at some point.

These are two examples of the chance-risk game of gliding. If you choose the risk too high, in the worst case you can end up with a total failure, i. e. an outlanding, or at least a considerable loss of time if you stay on the slope in a weak climb for a longer period of time.

higher altitudes, where it is still solely a matter of optimising the flight, you must always have a plan B in mind. If you arrive at the supposed release point and only then think about where you are going because the supposed thermal is not there after all, this can mean a very long diversions – namely if you can no longer get over a mountain ridge lying across the direction of flight and in the worst case you even have to fly back down a valley. Here it is important to look at alternatives beforehand or to opt from the outset for what may only be the second-best solution, but which would only cause a small diversions if it did not work.

Now a risk-reward consideration comes into play. How much time can I gain if I catch an upwind that is one meter better? With perhaps 500 metres of altitude to climb and a three-, rather than two-meter thermal, this is just 83 seconds. So you have to put the chance of gaining 83 seconds in relation to the possible risk of a large diversions. With a cruising speed of 120 km/h and a diversion of possibly only four kilometres, which is very, very little in the mountains, this already adds up to 120 seconds in the cruising speed alone. Add to this the additional altitude of about 100 metres that must be climbed for the diversions, which means an additional 50 seconds at an average of 2 m/s. In this arbitrarily chosen example, the risk of losing time is more than twice as high as the possible time saving would be. ♦

The wide valley north of Omarama,
with Aoraki/Mt. Cook in the distance

Soaring in Omarama

Challenging terrain

Omarama is a small village in the Mackenzie Basin on the South Island of New Zealand. It is located almost exactly in the middle of the island, to the west and east it is 100km to the coast. The whole region is very hilly with wide valleys and many lakes. On the west side are the Southern Alps, whose highest peak Aoraki/ Mt. Cook is 3724 m high. The whole thing is reminiscent of the European Alps and yet quite different.

Text and pictures: Roland Bieri

The weather offers the full range with thermals, convergences...

New Zealand is a never-ending playground for nature lovers. In the vicinity of Omarama, agriculture dominates with huge irrigated fields and endless pastures. In less than an hour's drive you will find remote valleys, which allow the well-equipped hiker to go on adventurous hikes lasting several days. Not only for flying, a SPOT is recommended here! Many of these valleys also have no access road or can only be reached by off-road vehicle. That's why there are quite a lot of „airstrips" for the farmers. These are often over 500 m long, but narrow. With a wingspan of 20 m or more it gets tricky: bushes, boulders or fences border the strips. Also, they are sometimes barely recognizable from the air. If the landing is successful, the problems are just beginning. As a rule, there is no mobile phone coverage, it is strongly recommended to inform your colleagues on the radio that an outlanding is imminent before sinking into the valley – it is not always easy for outsiders to determine the exact position. Once I was able to listen to an Air Newzealand scheduled flight forward an external landing message to the airfield frequency. The glider pilot has reported his landing on the emergency frequency 121.50. It then took a brave tow pilot to come to the rescue. An alternative would have been a helicopter, because the access road is missing. In the widervalleys there are many fields, which are large, but crisscrossed by barely visible, massive fences. Again, landing can be problematic. As a cautious newcomer, I oriented myself to the few airfields in the moderate flight conditions.

The weather

As a relatively experienced alpine pilot, I imagined that flying in the Southern Alps should not be a completely new experience. Gavin Wrigley, the chief flight instructor of the Omarama Gliding Club, also knows the European Alps . He aptly summed up the weather: „it's different".

I was able to observe the weather extensively beforehand on a 5-week round trip. The driving forces are the westerly winds, which circle the earth along the 40th southern latitude. The Roaring Forties. Sounds a bit like a midlife crisis and the effects are also similar – unpredictable and somewhat irratio-

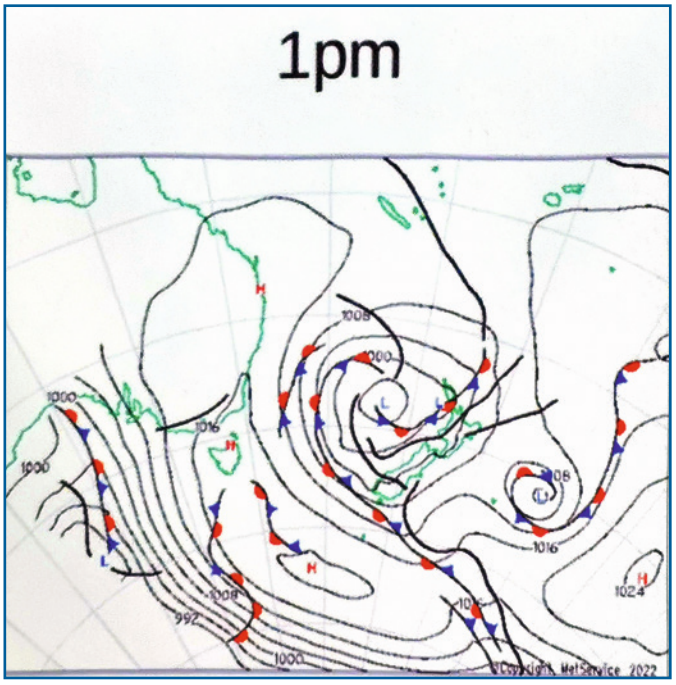
...slope wind and waves until the rain comes

nal for outsiders. New Zealand, along with South America, is the only obstacle that stands in the way of these winds on their way around the globe. This basic wind direction is still influenced (disturbed?) by highs and lows, which, generally known, have an inverted direction of rotation in the southern hemisphere. As an island, New Zealand also has a pronounced sea breeze effect. During the course of the day, this causes winds that blow from the sea far into the land – especially on the east and west coasts. The breeze from the east breaks through regularly in the afternoon to Omarama. The Southern Alps as a distinctive mountain range also have their typical influence on the wind system and produce valley and mountain winds. Because the islands are rather small, one can imagine that all these phenomena merge happily. Not only me, but also the local pilots often did not really understand the forecasts. The weather models also have their trouble with the specifications, so that the weather briefing was often a guesswork: what will the wind be like? At altitude, the west wind dominates. On the ground there is no wind, perhaps a weak westerly current. In the afternoon the breeze comes through from the east, which can give 30 knots. This current is only a few hundred meters thick (a so-called „carpet wind“) and has already spoiled many final approaches. The mountain and valley wind systems can hardly be compared with the European ones and are only understood with a lot of experience.

The airfield

When you arrive in Omarama, you will be amazed by the generous space. On the airfield map there are 2 parallel runways of 1387x50 m, next to an approximately 1700 m long strip for winch launch. Without obstacles (e.g. massive runway markings, which have become so fashionable on European airfields...) it gives it a landable area of about 1500x250 m. In addition, there are three 150 m long hangars, a campsite and the Pink Glider airfield restaurant. The entire infrastructure was renewed for the 1995 World Cup, and this major event must have been the event of the century for the village of 300 souls. The main activity at the airfield is gliding. Powered flights take place only sporadically, for example for visits on weekends.

Top: The airfield can be recognised from a distance, especially by the three 150 m long hangars **Bottom left:** The spacious briefing room in the terminal **Below right:** A weather situation that is optimal for irrigating deserts



Various clubs are located on the airfield. On the Internet you can find the Omarama Gliding Club and the one-man flight school Kahu Soaring, which offer foreign guests the opportunity to fly. Glide Omarama, the commercial provider at the site until 2020, has ceased operations due to official requirements.

The planes

The Omarama Gliding Club has two Duo Discus' and a Discus 2b, which can be chartered. Kahu Soaring also provides a Duo and a Discus b. Most aircraft are equipped with an S100 computer in addition to the standard instruments. As usual in Anglo-Saxon countries, the airspeed indicator and the vario show knots and the altitude is displayed in feet. For the unfamiliar pilot it can take some time to get used to. If you know the S100, you can load a profile with your preferences. Apart from that, bringing a mobile device (Oudie or XC Soar etc.) might be helpful. The airspaces are not a big problem.

Fly

I contacted the Omarama Gliding Club in advance via the website and quickly received an answer that it was possible to fly with a temporary membership. However, this rather informal registration did not quite arrive at my destination, so no plane was booked for me. Fortunately, November was still pre-season, that wasn't a problem. Presumably, it is safer for a guest pilot to make a registration via Kahu Soaring. The various companies work well together. The Kiwis are good at improvising and it was really uncomplicated on site – a check flight with a flight instructor, the address for the membership and the bills and it was time to fly. Unfortunately, I caught two weeks with very moderate flying conditions. At first it was nice in the morning, allowing a short flight after noon and in the afternoon the rain came. Or vice versa. For the second week, a weather situation has established that nipped all thoughts of outdoor activities without rain protection in the bud. So only a few local flights were possible, which allowed a small insight into the magnificent landscape. The fabulous gliding conditions were withheld from me – another good reason to travel to New Zealand again. ♦

Links:

Kahu Soaring:
https://kahusoaring.nz/

Omarama Gliding Club:
https://www.omarama.com/

The management of proper hydration while flying cross-country shows considerable individual differences. We present results from the thesis of Dr. Stéphane Dubreuil about this important topic in aviation medicine. The purpose of the French study was to gain a better understanding of the prevailing practices and needs of glider pilots, particularly during longer flights.

Text and pictures: Stefan Zlot

Proper hydration or **“drinkn’pee”** increases flight safety

This descriptive study was conducted between April and August 2022 by using an anonymous questionnaire. 150 questionnaires could be evaluated (140 men, 10 women). The average age is 50 years (14-84), 82 % of the respondents have more than 200 flight hours. Some 87 % have a valid licence and for 95 % of the pilots' flights last more than two hours.

Eighty-nine percent drink in-flight without worrying about urination and 50 % do not change their eating habits, while 51% use a drink pouch such as CamelBak®.

Fifty-five percent say, they feel the need to urinate after two hours and 32 % after five hours. Seventy percent think, that not being able to urinate poses an additional flight risk. For 63 % this is no reason to limit the flight duration. Seven percent have unintentionally urinated into the glider seat and 23 % had to make an urgent landing because of the urge to urinate!

Twenty-nine percent use a water bottle or a plastic bag for relief, 28 % use a urinal (e. g. Penilex®, Conveen®Optima), while 20 % are unable to urinate in-flight! Twelve percent use no equipment, 11 % use Uribag® for men or for women and 6 % use diaper pants.

Forty-eight percent urinate circumstances providing, 39 % as soon as there is an urge to urinate and 13 % as soon as it becomes absolutely necessary

Conclusion

Urinating is important for all glider pilots who perform flights that last longer than two hours, because urine production is continuous and related to proper fluid intake.

A good drinking system such as CamelBak® is better than a bottle. The natural urge to urinate should not be prevented by deliberate dehydration and thus compromising flight safety.

This study was able to show that only around 30 % of pilots maintain a sufficient fluid intake and can pee in a relaxed manner! Most pilots drink only a minimum, although in recent years a tendency showing improved in-flight drinking behavior, combined with the ability to urinate, may be ascertained. In other words, risk awareness of insufficient hydration, urination and landing with excessively full bladders has increased.

Left: CONVERTUBE turns every PET bottle into a fully-fledged drinking system, e.g. via www.sourceoutdoor.com/product/convertube/

Below: The Crux-Reservoir-Drinking System by CamelBak® supplies the pilot with water with a volume of two or three litres www.camelbakshop.ch/de

More than one third of xc pilots are limited by this issue or take unnecessary risks! Those who drink without restriction also have a good relief system and fly with corresponding composure. However, more than one fifth of the pilots do not manage to urinate in-flight, mostly for psychological reasons. Therefore, this topic should already be addressed and worked on during basic training, so that „drinkn'pee" becomes a routine.

Not a taboo theme

In my club I address the issue during the course on „Human Factor", as well as regularly in the context of our xc lectures. So, why not introduce „drinkn'pee" as a safety topic in your club? The fact that glider designers do not deal with the subject is another story. ♦

Source:

„La miction en vol à voile – Etude sur les comportements humains et les moyens techniques qui découlent du besoin physiologique d'uriner en vol à voile". Dr Stéphane DUBREUIL, Mémoire pour la Capacité de Médecine Aérospatiale de Toulouse session 2022-2023.

Bottom left: The Conveen Condom urinal is a self-adhesive condom urinal made of latex-free material, e.g. via Coloplast

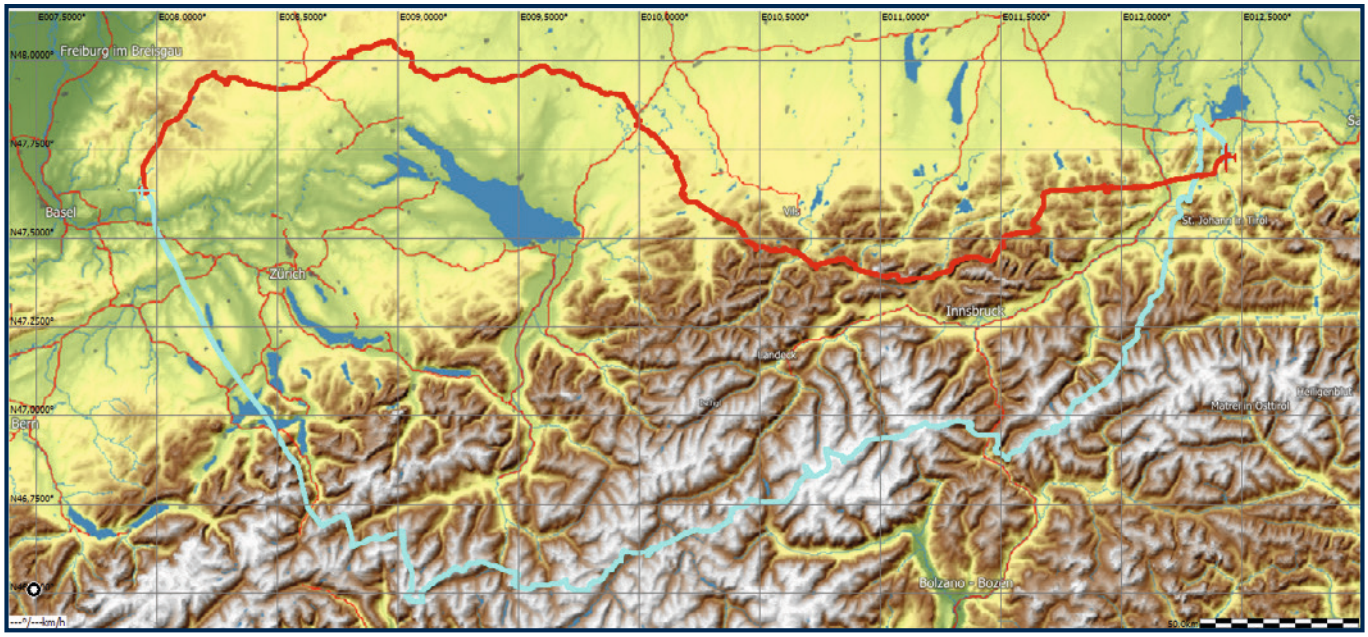
Bottom right: Almost all pilots of the current German female national gliding team use this system by world champion Katrin Senne www.frauenurinal.de

Two Days on Tour

How to make a two-day gliding trip a success

It doesn‘t always have to be a day-long travelling glider flight,
even a short trip – there today, back tomorrow –
can be mega fun!

Text and pictures: Jan Lyczywek, Karten: SeeYou



The trip to the Hotzenwald in August 2020. Outbound flight in red, return flight with long tow from the Hotzenwald over Switzerland towards the Alps in light blue

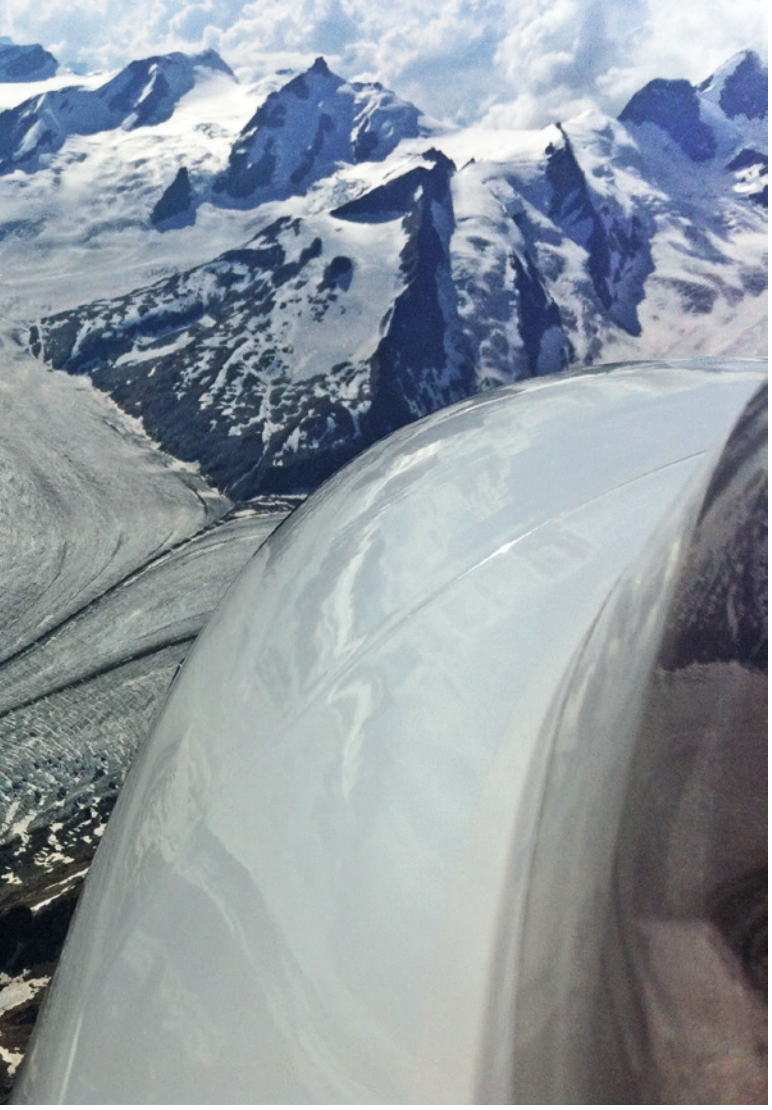
Cross-couontry flying is probably the most beautiful thing you can experience in gliding. What could be more romantic than spending a week or two just flying from one airfield to another, as far as our wings will take us and wherever the weather takes us? However, the time commitment is great and you also have to be able to sit out a few days of bad weather. In the last few years, I haven't had the chance to do a really big, week-long cross-country flight.

Then WeGlide introduced the new „Travel by Glider" scorecard. Here, it is not individual flights that are scored, but so-called „journeys" – a nice term. Such a journey can comprise several flights. A maximum of four „standing days" may lie between two flights of a trip. And of course, the individual travel flights must lead from A to B, i.e. the departure and arrival points of one and the same flight must not be identical. Of course, otherwise it wouldn't be a cross-country flight. I like the idea of a journey without an engine very much.

It was only with the help of this list that I realised in retrospect that in the last few years I had never done the big touring glider flight, but I had done a two-day glider flight trip every year: one day there, the next day back. And that such two-day trips could be the ideal introduction to cruise flying. So here are a few experiences and tips especially for such two-day cross-country trips.

Their great charm is that we don't need a retriever for them. By definition, the furthest point of a two-day tour is already reached in the evening of the first day; ideally the target air-

Below Two-day tour to Saanen in the Bernese Oberland in July 2018. Outbound flight red, return flight light blue. **Below right** Well hidden in the bombproof shelter in Saanen



Above Tourist highlight: the Great Aletsch Glacier, inaccessible to me as a return destination from Unterwössen, but on a cruise flight (as here on the outward flight to Saanen, a total distance of just over 400 km) virtually on the roadside

field. It would make no sense at all to have the trailer on the ground with or behind you. Even with the worst possible luck, an outlanding shortly before the destination, there would still be a whole evening for organising and a whole day (the original return flight day) for the actual retrieval tour.
The second day's leg then leads back towards home anyway; the worst possible retrieval tour on the second day shortens with every kilometre and soon no longer differs from the normal retrieval distances for normal outlandings on normal cross-country flights.

Insights

Flights from A to B, i.e. flights that are not designed to return to the take-off airfield in the evening, but which have a destination as their goal – let's call them travel flights – such travel flights held two great insights in store for me; insights that seem self-evident in retrospect, but which were surprising to me when I actually experienced them for the first time.

Insight 1: When flying touring, you don't have to fly very far to have flown incredibly far.

Even if you only fly to the neighbouring airfield, it will be a little adventure. One of my most exciting and also most difficult flights last year was the ferry flight to the 2022 Ka-6 meeting in Ohlstadt. Only ninety kilometres away, of which the first twenty or so were wisely bridged in aerotow and the next twenty or so were glided from a high release altitude; so there were only fifty kilometres to cover under my own power from

the first bar to the destination. Just the Silver C distance, but it was a tough one! Blue, stable, average gradients of 0.2 m/s and an average of 20 km/h on this stretch. But what a feeling of elation when I had final approach for the first time 15 km before Ohlstadt!

The emotional intensity of the success of actually having arrived doesn't seem to depend on the distance at all. Even small and medium distances feel wonderfully far when they don't go around in circles (or triangles, squares or yoyos) but from A to B. A little less than a year before, I had spontaneously flown to the incredibly hospitable little glider airfield of Oberhinkofen near Regensburg; an easy flight with no surprises and no lows, albeit in moderate weather. Objectively, a distance of well under 150 km, not worth mentioning. Subjectively, however, a real journey and a great adventure. Even the next day, while strolling through the old town among crowds of tourists on the almost nine-hundred-year-old Stone Bridge, the thought gave me wild joy: You really fly here.

Both insights about cross-country flights can be summed up in one sentence: In cross-country flights, you get much further than you fly.

However, this realisation also has its downside: When you proudly put the result of all your efforts, namely the IGC file, online in the evening, after such a perceived long journey, you have to scroll down astonishingly far to finally read your own name in the daily ranking list. Against the yoyo commuters, who cycle up and down the same fast strip six times, we one-way flyers can't beat them in terms of points anyway. And the triangular and square flights also have their area bonus ahead of us. But let's not fool ourselves: Even without these effects, you won't get the maximum cut and distance on a straight flight into the unknown that would be open to a local crack on his parade race course. That's simply not what these flights are for! Recommendation: Scroll without sulking.

Insight 2: With a cross-country flight, you can suddenly reach destinations that were simply too far away before

The Wasserkuppe, for example, a dream destination for every glider pilot, and a nostalgic one for me, because I was allowed to make my first solo flight there in 1998 and my glider also had its first flight there; however, that was a few years earlier, in 1964. As a turnaround for a target return, however, the crest is far beyond the reach of my home base, at least for me with my aircraft; and also far off the beaten track for us Alpine pilots. Accordingly, the Wasserkuppe always seemed very far away on my mental route map. That's why I was completely

Left Two two-day tours in 2021: Wasserkuppe (outbound flight red, return flight green) and Regensburg (outbound flight light blue, return flight purple) **Top** Another tourist highlight: Regensburg's old town with the cathedral and the Steinerner Brücke (stone bridge) **Right** Arrived at Wasserkuppe

taken aback when one evening, out of curiosity, I looked up the one-way distance: what, only just over 350 kilometres? That can't be! But it is. You could fly there! And the next time the weather was right, it worked out.

At first glance, the idea seems very banal: One way, I can logically fly twice as far away from home as I can fly to the farthest destination I dare. For me and my aircraft, it currently looks like this in figures: At the farthest (thermal) out & return so far, I turned around 280 km from home; if I hadn't forgotten to close up, the result would have been 560 km destination return. I've never cracked the 600 km mark thermally; but 500 km is something I'm reasonably confident of reproducing in good weather in known terrain.

On cross-country flights I fly into unknown landscapes at some point in the afternoon, which slows me down. If we deduct a generous ten per cent for this, we still have a cruising range of 450 km! A huge increase compared to my 250, or at most 280 kilometres, target return range! With 450 kilometres, Mikulovice can be reached from Unterwössen in the north-east and Aosta in the south-west. Only with examples like these do I really realise the possibilities of travelling by glider. A circle drawn on the map would probably help to understand this amazing radius even better.

And back?

Surprisingly, the return flight was always the easier one for me. The reasons for this, as is so often the case with long-haul flights, lies entirely in the mental realm:

- One decision less: On the outward flight, despite all my good intentions, I always think long and hard about whether I should turn around and make a „completely normal", sensible return journey. I still remember well how I postponed the decision beard by beard on the flight to Saanen in 2018. Should I decide on the Flüela Pass? Or at the halfway point? Or at half past three? Arriving at the point of no return and still undecided, I leave the decision to the lot: if the next updraft has a two in front of the decimal point, then I fly on. It was 2.8 m/s and for that I am still grateful today. On the return flight, on the other hand, you are freed from this decision-making burden right from the start.
- Less recovery effort: On the outward flight, an outlanding hurts the more the closer it is to the destination. On the return flight, on the other hand, the effort required to recover the aircraft becomes less and less the closer one (still) gets to the destination. The fact that an outlanding during such a two-day tour is, objectively speaking, extremely unlikely anyway, unfortunately does not matter: gliding without an engine is a mental sport and the subject of an outlanding is, of course, subjectively always present.
- Less new: on the return flight you fly into increasingly familiar terrain. This leads to the funny effect that you „actually" already feel at home as soon as you arrive back in the „destination return area".

On my return flights from Saanen, from the Hotzenwald, from Münster and from Barcelonette to Unterwössen, this feeling set in as soon as I reached the Upper Engadine. From there it is still about 250 kilometres to home; but on the return flights from home I also reach the Engadine, and conversely I had to fly home from the Engadine as usual „only“ on familiar terrain.

Planning

Planning is one of those things. For some people, anticipation sets in when they meticulously determine every little detail weeks or even months in advance. And the real satisfaction after the flight only comes when everything has worked out exactly as expected. Others love the very uncertainty, which they prefer to call openness, and the adventure of simply flying out into the blue; afterwards they are delighted by the supposed or actual coincidences that unexpectedly came their way. You can already guess: the planner plans not so much for better success, but for his peace of mind, and perhaps also to convince himself first of all that what he has planned could succeed. And the non-planner? They don‘t plan not only because they don‘t see any objective benefit in

And all that fits in there? It really does fit, even if you could do without a lot of it

planning, but also because any planning subjectively destroys their sense of freedom and adventure.
The „right“ amount of planning therefore depends more on the respective psychological disposition than on the actual requirements of the project - the only sobering advice left is that everyone has to plan as much or as little as feels right. And consequently, I cannot explain here how „one“ plans „correctly“, but at best what level of detail in planning has worked for me so far.

Weather

Even if others claim otherwise: I'm not particularly creative when it comes to the weather. When the weather situation becomes more concrete the night before and the TopTask turns everything purple, it doesn't spontaneously give me any brilliant new ideas. On the contrary, I run the risk of doing exactly the same thing again that has worked so well for this weather situation. Another triangle. Another target back. I no longer get any new ideas. I have to have an idea for a cross-countra trip that fits the weather long beforehand; it's in my head as a target and at some point it flashes up again, triggered by a similar forecast.
The trick with two-day trips is quite clear: we have to think from the day of the return flight. So the thought the night before is not: Where could I possibly fly to tomorrow? Much more important is the question: Where could I safely fly back from the day after tomorrow?
Weather can generally be predicted very well over the short period of only two days. The usual thermal forecasting tools are now so good that I rely on them; in my case on the DWD with its TopTask. However, more important than really great weather is homogeneous weather over a large area. It is better to accept weaker weather than to fly close to a hard weather limit!
The width of the weather area can be a real chess problem, especially if the destination is in the west. Many short weather windows are only just enough for a two-day trip west. For this, however, we have to make direct use of the first day after the last disturbance has passed. So we fly in the back weather.
The disadvantages: Initially, the base will still be low and the north-westerly wind will interfere. Where mountains with a westerly to northerly aspect can be dammed up, they will be dammed up and locally the base will be even lower.
The advantages: The air mass is enormously reliable, and towards the west we come very quickly into drier and drier weather with less and less wind, because we fly towards the new high and also because the high comes towards us with the general west wind drift. But this can be a disadvantage for the following day: It is quite possible that we will have to begin our return flight from the west in the more strongly broken-stabilised part of the high. Our narrow weather area has sneakily moved further east over us during the night. One day later, the west would perhaps already be under the next low-pressure disturbance, or at least in its forefield, with stabilisation including showers or even thunderstorms.
A travel route to the north or south mitigates the problem a little. Theoretically, the return route would have to be a little further east than the outward route in order to hit the best part of the weather area moving east. But that is theory; in practice I stick to the morning calculation run of the return flight day. A high that is as large as possible, as slow-moving as possible, or even stationary, completely relieves us of the problem of narrow weather windows moving on – and replaces it with the problem of increasing stability, typically from the third high-pressure day onwards. In this question, however, I am again relying on the calculation models, because I wont be able to to get to the bottom of the temp better than TopTask with ruler and pencil...
And what if the weather on the day of the return flight is not exactly as forecast 36 hours in advance? Don't forget that we have a powerful tool at our disposal to make the weather suitable for us: the long F-tow! This by no means has to be just a tow in the direction of the course to shorten the distance to be flown. No, it's about getting into better weather earlier and more reliably. Often twenty kilometres of towing plus twenty kilometres of gliding are enough, as mentioned above. Besides, this has the mental advantage that „the ships are burnt“.
The best example of a cleverly used, very long tow I experienced in 2020 at the Hotzenwald. The outbound flight the day before, half in the Alps, half in the lowlands, was quite problem-free in a good air mass. On the day of the return flight, the high pressure had prevailed: Strong easterly winds, and the Alb was to remain blue. How was I supposed to get east against the wind in the blue? And even if that worked: how was I supposed to get into the Alps late in the afternoon, when the mountains with their stronger thermals would have long since sucked the air out of a wide strip of Alpine foothills? There was an alternative: The Swiss Alps were very well calculated, with clouds, no wind. But how to get there from the southern end of the Black Forest, across the dead Swiss Midland? Impossible under their own steam. Towing? Crazy! Weather expert Marcus Neubronner finally asked me the right question that cut the knot: „Which option will give you the nicer day?“ Bingo. What would I do on the blue Alb? I let myself to be towed the 120 kilometres south into the Alps. It hardly made the flight home any shorter, but it was easily doable in the best weather – and the flight much nicer.

To clarify in advance

If I knew where I wanted to fly to, I called them briefly the

night before. But I didn't want to fix the take-off time, the tow destination and the first name of the tow pilot for the day of the return flight, i.e. the day after next! Experience has shown that all the details sort themselves out on the spot. No, I'm only interested in avoiding unnecessary and therefore really stupid mistakes; for example, if the destination airfield is simply closed because of a car race or a music festival. Or has just been reseeded.

For example, Münster in the Upper Valais, the ideally located stopover for flights to the South of France: you can normally always land there, but the gliding infrastructure and a tow plane, as well as gliding people in general, are only available for a few weeks in the summer, during the famous flight camp. And that took place earlier than usual in the 2022 season, because on the usual date the airfield and half the valley floor were transformed into a huge scout camp with 35,000 (yes, thirty-five thousand) participants... Even I don't think it's too much of a planning frenzy to want to know this beforehand. The other Swiss camps in Saanen and Zweisimmen also only provide glider operations for a few weeks in the summer.

Accommodation

Certainly, the most romantic is the tent, the most spartan the bivouac tarp hung over the wing. But I have the next long flight in foreign terrain ahead of me the next day. A warm room, a real bed in it, a shower of my own, a sumptuous breakfast buffet, plus fresh, hot coffee served by the waiter.... For the campers who don't know all this: It's called a „hotel" and it's simply a very sensible, therefore quite rational investment in the success of the next flight.

But here, too, personal preferences are very different. For my part, I like to stay in a hotel, but I don't like to book it in advance. I don't want to burden myself with an „obligation", however small, to „have" to arrive – or, in the case of unexpectedly fast progress, not to be „allowed" to fly on to an even more distant destination just because of a room reservation. And I don't like to be one of those last-second cancellations

Plush charm and a pompous name: as a tourist, you are allowed to enjoy a little cliché

that make life increasingly difficult for hoteliers. The price for this: during the flight, the small uncertainty as to whether I would find a roof over my head.
On the Wasserkuppe, this required a sprint from the airfield to the neighbouring hotel. The hotel door was already locked, ringing the bell didn't produce any reaction, but a second sprint around the house brought me to the car park, where a lonely person purposefully followed the direct connection line from the back exit to the only car left there. Halfway there, I was able to intercept him. Bingo, it was the hotelier and indeed he still had a room for me. The next morning he was allowed to offer a breakfast buffet for the first time after a long break due to the Covid 19 pandemic
On the other hand, during one of my stopovers in Münster (Valais), the friendly Swiss colleagues had already booked me a hotel room, made me a reservation for dinner and organised a rideshare for me, while I was still busy collecting my stuff from the cockpit in the hangar.

Chaos

Apropos stuff: The biggest danger for the success of the return flight does not lurk in the weather, but on the evening of the outbound flight, immediately after landing. You will be relieved and euphoric. You will have to tell a lot of things, most of it three times. Friendly people will be standing around you, you will meet new friends and experience a lot of helpfulness. Then you will go to a barbecue together. And only late in the evening in your hotel room will you realise: You forgot your wallet and all the chargers on your plane. No chance to get back to the airfield now and certainly not into the locked hall. For this reason, I packed a Tupperware box in advance containing everything I definitely need to take with me from the plane to the night's accommodation:

- Wallet
- Charger for the phone
- Second charging cable for the phone (the first one is in the cockpit)
- 2 chargers and 2 charging cables for the two powerbanks (yes, I'm a „redundancy scaredy-cat")
- Charger for the plane battery(ies)
- If necessary, a charger and charging cable for a navigation device such as an Oudie

This ready-packed „must-have box" goes into the also ready-packed bag or rucksack with the clothes and other personal stuff. The only thing missing from the plane is everything that needs to be charged overnight:

- the battery(ies) of the plane
- the phone
- both powerbanks
- and possibly a mobile navigation device such as an Oudie or similar

This way, even I manage to think of everything:

- „must-have box"
- bag/backpack with clothes and personal belongings
- everything that needs to be charged.

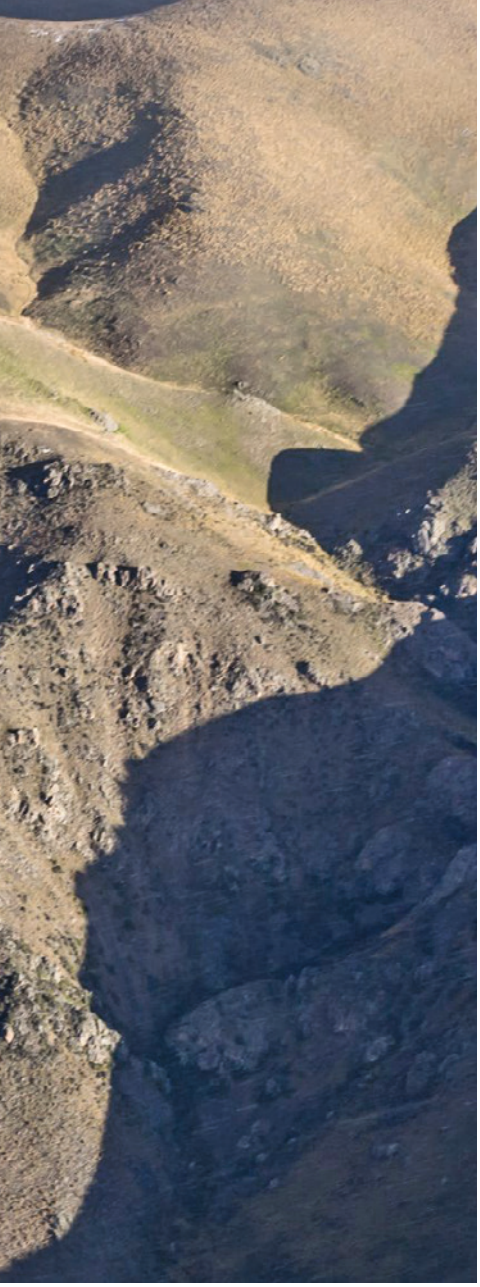
Leave everything else (and that is still a surprising amount of junk) on the plane. In my opinion, all this other stuff depends so much on individual preferences that I don't want to give a checklist here for the many possible, perhaps necessary, perhaps unnecessary, perhaps only nice-to-have items of equipment that you could, should or must take with you. Just one important tip here: We are in densely populated, civilised Europe. The vast majority of forgotten items can easily be bought (or re-bought) along the way.

Statistics

How reliably do such two-day tours work out? I have tried it seven times in the last five years. Five of them have worked out, namely to Saanen, to the Hotzenwald, to the Wasserkuppe, to Regensburg and to Barcelonette (the latter, however, as a two-day tour with a Duo Discus). I cancelled a planned flight to Zweisimmen because of the increasingly biting north wind, so I ended up with a nice trip back to the Bernina. Only once did I sit in the field, in August 2021 during an outbound attempt, shortly after take-off, less than 65 km from home (of which almost 30 km were even the tow) – this could have happened on any normal cross-country flight and had nothing to do with the hoped-for cross-country flight.
In addition, there were two trips to Barcelonette with the Ka 6, each planned for four days, with planned stopovers in Münster on both the outbound and return flights. These also worked out, and I was even able to skip one of the stopovers. What's interesting about all these statistics is that I've never actually sat outside on the return flight; and of all the return flights, only one was really difficult.
Looking back, there's really only one question that remains open: Why didn't I do such two-day tours much earlier and much more often? ♦

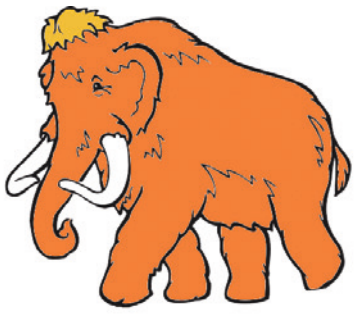
STRESS in the cockpit

When we are exposed to stress in everyday life, our body reacts as it did in ancient times when we had to protect ourselves from dangerous animals.

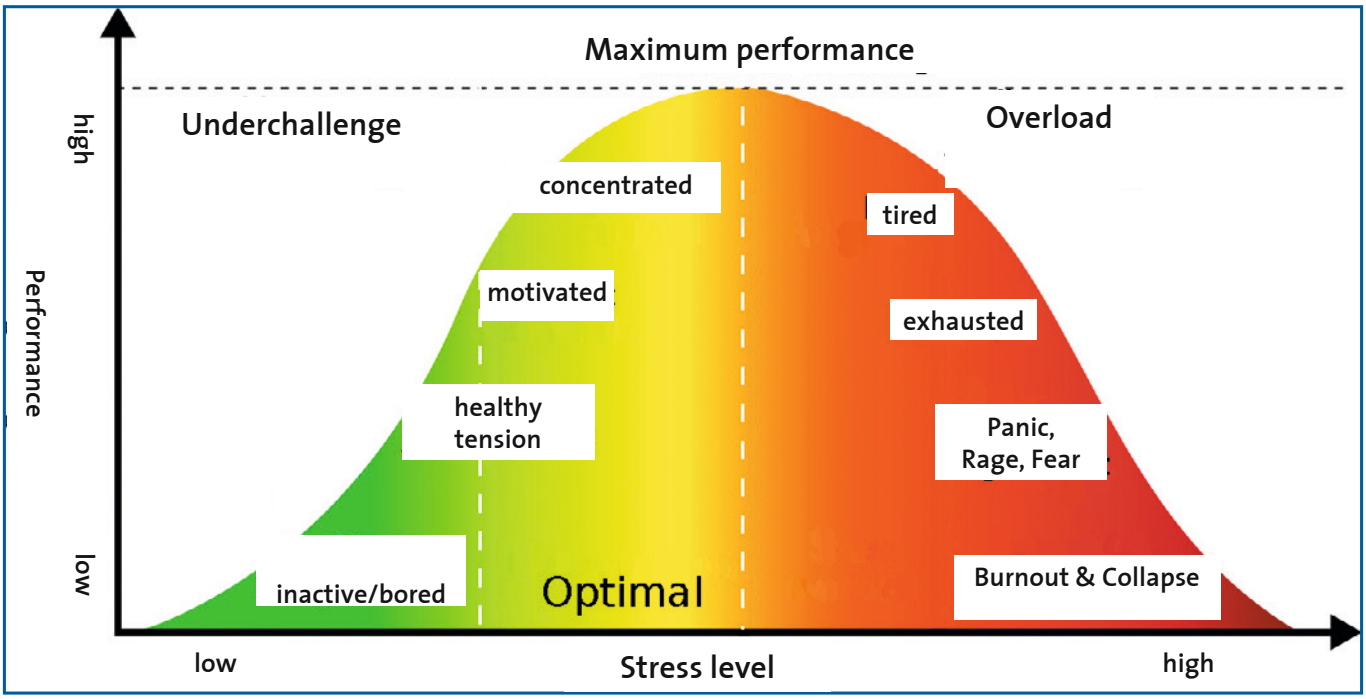


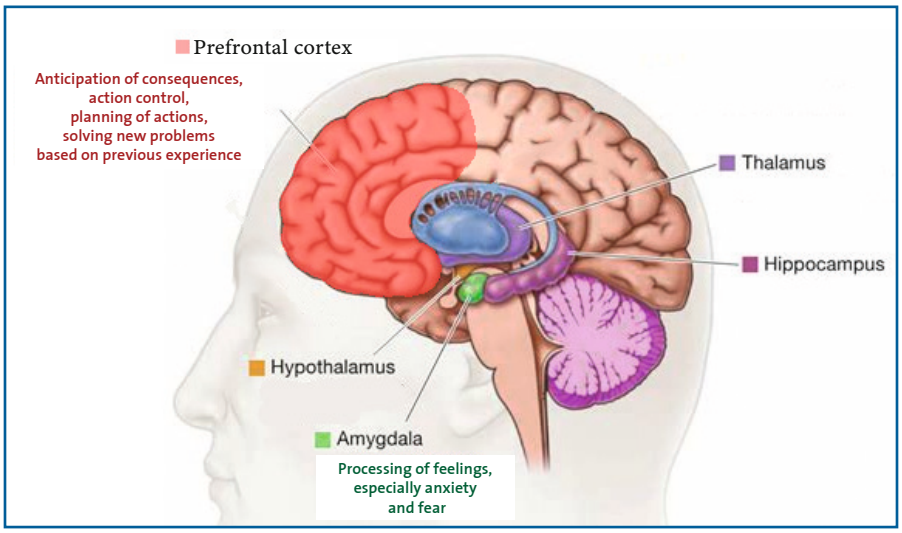
The term „stress“ often has a negative connotation in everyday life. The definition from the professional world, which describes stress as a mental and physical reaction to an external or internal trigger (stressor), is much better suited for our purpose here. Here we are talking about ideas on how to increase flight performance with the right amount of stress.

Text: Sabrina Schels Pictures: Sabrina Schels, Kahu Soaring



When there is a perceived threat, the amygdala, the part of our brain that processes emotions, is activated and stress hormones such as cortisol, adrenaline and noradrenaline are released. Our body prepares itself as best it can for the emergency by increasing breathing rate, blood pressure and heartbeat. Furthermore, blood is pumped more to the muscles and all functions that are not essential for survival, such as our digestion or reproduction, are inhibited. This behaviour, called the fight-or-flight response, was crucial to our survival in ancient times. For example, if we encountered a dangerous animal, we either ran away or went on the attack, depending on how we assessed the situation. In our often hectic everyday lives, however, this reaction is triggered far too often nowadays, even if in reality there is often no danger to life. In addition to Flight and Fight, psychologists have also identified Freeze and Fawn as other patterns of action. In the cockpit, however, none of these reactions are suitable for solving a problem.





The stress-performance curve

Yerkes and Dodson hypothesised that our performance depends on the level of tension, which is shown in the picture above (performance curve). It is interesting to note that our performance not only decreases with too much stress (to the right of the maximum), but also with too little pressure (to the left).

When we are underchallenged or bored, we are not mentally challenged enough. Often our „head is somewhere else". The risk here is that we are less attentive as a result and, for example, do not work through our checklists with enough care.

In contrast, we are overtaxed when we are in the right half of the stress-performance curve. We fly the plane less precisely or may not be able to „think as clearly".

The area we are aiming for is in the upper section of the curve on the left-hand side, before the maximum is reached. This is because we are not only fully concentrated here, but also still have some free capacity to react appropriately to unexpected events.

It is important to note that the same stimulus is perceived as differently

Increasing load can lead to neglecting airspace observation and fixing fathoms or instruments

stressful from person to person and also depending on the day by the same person. How strongly we react depends on

- our subjective assessment of how dangerous the current situation is (Can we defend ourselves against it?)
- our physiological state at that moment (For example, are we relaxed or are we already under pressure?)
- our character (For example: How have we dealt with similar situations? How willing are we to take risks?)
- and, from a flying point of view, our current level of training (e.g. how many cable break have I had in the last few months?)

In short, everyone feels, reacts to and copes with stressful situations differently.

Impact on body and mind

In order to know in flight which part of the stress-performance curve we are at, let's first look at the symptoms and impact on our performance that accompany excessive stress (distress).

On a mental level, excessive tension negatively affects the prefrontal cortex – the part of the brain where complex mental and cognitive processes take

place. It is also responsible for regulating thoughts, actions and emotions (***picture left***). In flight, this can manifest itself as in the following examples:

- Fixation on (often incidental) details, the overview is lost. One stares at the instruments or the thread, while good airspace observation is neglected.
- Forgetting (mental block), mixing up or incorrectly applying operating procedures that are „normally“ taken for granted. A classic example is to confuse the landing gear lever with the airbrakes on approach, or to apply throttle instead of taking it out.
- Slowed reaction; the pilot freezes first before initiating the spin recovery.
- Emerging hecticness creates a tendency to try to „be more effective“. The pilot skips items on the checklist that he/she considers less important.
- Behavioural change, increased irritability, emergence of extreme negative emotions (anger/fear).
- Difficulty concentrating and making decisions. Instead of solving the problem logically and strategically, thoughts go round in circles or the jumble of thoughts creates chaos. You feel like you can't think straight or that you don't have a "Plan B".
- Acting hastily and without having thought through the plan.
- Change in communication behaviour, loss of radio discipline, swearing or dead silence from an otherwise friendly and talkative pilot; stressed student pilot only gives monosyllabic answers because he cannot listen due to the overload.

Physical symptoms include an increased heart and breathing rate, which can be accompanied by the feeling of "not getting enough air. Excessive stress can also lead to headaches and dizziness. As our body prepares for flight or attack, muscle tension causes us to:

- clutch the stick possibly so tightly that our knuckles turn white
- pull our shoulders up
- pressing with both feet against the rudder pedals, suddenly get back and limb pain in an otherwise comfortable cockpit
- no longer fly smoothly, but rather make jerky control movements
- and therefore perceive updrafts as weaker or as a reduction of our glide range

With good preparation, most of the...

Finding maximum performance

In summary, too much stress in flight

...physical stressors can be eliminated

reduces decision-making, memory, flight safety and physical comfort in the cockpit. Also important to know is that when we are under too much pressure, we automatically fall back on what we learned first. If we are not aware of this, we run the risk of unconsciously repeating mistakes we made during our flight training in stressful situations.

When we are in the optimum range, our "head is in the game". Our flight is "going really well" and we have the feeling that we are in tune with the weather and the aircraft. So the question arises: How do we achieve the "right" level of stress in flying?

Pre-flight

Preventive measures reduce underlying stress that is already present before or persistent during the flight. On the one hand, if we climb into the cockpit more relaxed, we have a larger tolerance range available to us in the air.

Physical stressors such as loud flight or background noise, unwanted draughts, a poor view of the outside world or an uncomfortable seating position can often be virtually eliminated by small adjustments to the aircraft. Hunger, thirst, heat, cold and a full bladder also take their toll on the body in flight and reduce the ability to concentrate. Appropriate personal equipment is therefore crucial to enable the pilot to meet his normal needs in flight.

Hectic pre-flight situations can be avoided by taking enough time to prepare your aircraft and equipment early, as much can be done the day before.

In the long run, it generally pays to pay attention to a healthy lifestyle. Sufficient good sleep, regular exercise, balance and relaxation as well as a healthy diet have a positive influence on our mental, physical and emotional state.

Not only does a high level of exercise allow us to better handle stressful situations in flight, it is also important to identify and analyse our own triggers. Because only when we are aware of them can we improve our flying skills in this area and think of solutions for similar situations in the future. For example, we can reduce the fear of outlandings by practising them with a flight instructor.

During the flight

There are also different ways of dealing with stress during the flight.

To relieve physical tension, it helps to

shake out the limbs as much as possible, to clap the thighs or the hands. To „come down“ again, it also helps to slow down your breathing for a few breaths, counting slowly to eight as you inhale and exhaling just as slowly.Especially when you feel overwhelmed, you tend to forget to include all available resources. In the simplest case, you could give yourself a break and hand over to the co-pilot or contact FIS for further weather and traffic information.

Often glider pilots are faced with complex problems. The saying „Aviate – Navigate – Communicate“ is intended to assist the pilot in decision making and priority setting. What sounds trivial in theory is often much more complicated in reality when the pilot is mentally impaired due to excessive demands. Turning the radio down to whisper volume in the meantime can often make it easier to concentrate.

„The tow home will be so expensive“, or: „The others won‘t be thrilled if they have to bring me back with the trailer again.“ Who hasn‘t had these thoughts just before landing out? They distract us and take up resources in our already overloaded brain that we desperately need to find solutions. Identifying unhelpful thoughts and how best to silence these voices is something everyone has to figure out for themselves. „I can worry about that later, right now I need to focus on X“ can be a useful counter-argument.

Playing out a „worst case scenario“ in your head in extreme situations can be helpful to realise that even in the worst case scenario, you survive – planes can be replaced. A quick check of facts can also help to reduce the swelling panic: „With this glide ratio, I can make it to the next airfield even in a severe sink!“ or „Worst case, I can probably, I can probably land in this field below me.“ If we realise that there is no immanent danger to our lives, the situation seems much more manageable. We no longer feel powerless and our stress level is

Deep in the middle of mountains - this increases the heartbeat of many pilots

reduced. Now we can begin to think through different approaches to solving the problem.

We have learned from the good cross-country pilots to always have several options at hand. If plan A doesn't work, we simply switch to plan B or C without much drama. If you think about the different options during the more relaxing parts of the flight with little time pressure, you stay focused even when your mental load is low and you don't have to make a decision in the rush. Consequently, the alternatives are better thought through.

Sometimes, however, the best solution is to leave stressful situations over which we have no control. This includes, for example, leaving a thermal with many other aircraft or flying away from a turbulent slope. Flying closer to the outlanding field can be equally calming, as we can now concentrate fully on looking for upwind until the actual landing.

Finding the best solution personally

In conclusion, I would like to mention that the topic of „stress in the cockpit" is very close to my heart personally. In our increasingly hectic everyday lives, acute and chronic overload is on the rise in the population. There are many self-help resources available to non-pilots these days. While at least a few scientific studies and teaching materials have been published on professional and military pilots, there is not really any advice specifically tailored to hobby and glider pilots.

My aim was therefore, on the one hand, to give the reader a better understanding of why we react the way we do in some situations. On the other hand, it was important for me to present different ideas for reducing stress both in flight and preventively. The suggestions mentioned here should only serve as an aid for the individual pilot to find the best solution for him/her personally, because everyone feels and reacts differently to stressful situations. ♦

After the outlanding, there is enough time to think about retrieval

Ready for

We were in good hands with our flight instructors Heinz Brem (second front left), Jonas Langenegger (top far right) and the ground team Mike Hürlimann (front left outside), Markus Gemperle (front, second from right) and Christian Syfrig (to the right)

„Fly the Limit“

Middle of March it was time: female glider pilots from all over Switzerland met for the Acro & Safety Day in Schänis.

Text: Bea Guntli, Pictures: Lucretia Hitz

A beautiful spring day, the sun is shining and warming. The considerable number of female pilots who gather for the briefing promises, that the next flying season is just around the corner. Finally, we glider pilots receive a warm welcome. We enjoy coffee and pastries and talk about the past and the future. We have one thing in common: we love flying. Today we want to expand our flying experience, get to know our limits and, above all, have fun.

After the official briefing, Heinz Brem gives us a short but concise overview of unusual flight positions and risk factors. Sliding curve, spiral dive, falling backwards, to name but a few. Every flight situation should be controllable, that is our goal. Heinz knows the subject very well. He knows where does danger lurk and how to "free" oneself from such flight situations. He teaches us this in a clear way and wants to let us experience these limits. I am looking forward to it. In the meantime, the other instructors have arrived: Stefan Heldstab and Jonas Langenegger, both well-known names from the aerobatics scene. Today we are in good hands, I have no doubt about that.

And finally it's time to get ready for take-off! I make my first flight with Jonas on the Fox. Great! The opportunity to fly with a world champion doesn't come along often enough. What are my goals for this flight? The question is quickly answered: to fly what I can't yet do on my own. We discuss the programme, push the Fox onto runway 34 and here we go.

The Fox flies fast, responds directly. We fly vertically against the sky, as soon as the yaw string turns and blows upwards, we fall down backwards. Male, female, catch up speed and again. What a feeling! I fly the Fox, as Jonas does the fine correction. It's impressive how he can precisely calculate every deflection and always brings the Fox into the perfect position. After just 20 minutes we have to prepare for landing. We hit the runway at 130 km/h, which is also unusually fast. Fortunately, the day is not over yet. More flights are on the agenda. Practising spinning again, unintentionally falling into the spiral, drain, catching. An upturn, inverted flight, losing orientation and finding it again. The plane does what you ask it to do. A good feeling.

I will certainly benefit from the helpful experience on the next flights. It's a pity that the day went by far too quickly. But what remains are good acquaintances and above all the gliding know-how. Once again, a big thank you to our instructors, helpers and sponsors. It was fun! ♦

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PREVIEW

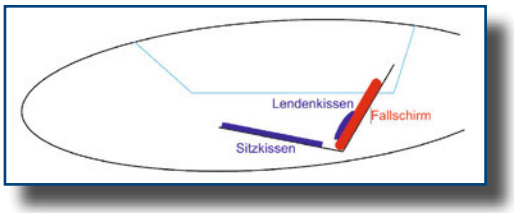
The next segelfliegen magazine will be published at the end of August 2023 and will be available in magazine shops and at segelfliegen-magazin.de/bestellungjahresabo/

Among others, these articles are planned:

Modern media in cross-country flight

Innovations in gliding are fascinating. Modern hardware and software helpers dominate the cross-country flying scene. Planning and analysis tools leave no mistake unnoticed. There are virtually no limits to the information available in the cockpits. Whether this is at the expense of sportiness or even safety is something we would like to get to the bottom of in our next issue.

Cockpit seating comfort and back protection



A hard landing can result in a vertebral fracture. A Dyna-foamR seat cushion therefore belongs in every cockpit: Dynafoam is practically the only foam that does not immediately „return“ applied pressure or impact energy, but absorbs shock energy without immediately passing it on to the body.

Which drive for the winch?

There are countless types of drives for commercially manufactured winches as well as for those built by the customer. All of them have their own characteristics, of course. However, we must always consider the motors in conjunction with the gearboxes or controls because the last have a major effect on the process.

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