

WEATHER FOR PARAMOTOR PILOTS

Weather is one of the most important topics to learn about, as you begin to fly. Paragliders are like leaves in the wind when conditions are rough, and new pilots can quickly find themselves out of control in bad weather. Learning to evaluate whether or not the atmosphere is benign at the time and place you want to fly, is one of the most crucial factors in maintaining your safety.

You can spend years learning about how weather works, and still find that your predictions don't pan out as expected. Even professional meteorologists get it wrong regularly! This article will explain where to find the information needed to make informed decisions, and what to look for, before you put yourself up in the sky under a piece of cloth.

Wind Speed:

The first thing to do, every time, before you fly, is to look at www.windmapper.com and www.windy.com. Those 2 web sites will give you a very good overview of what local weather conditions you can expect to find. Windmapper provides you with the expected average wind speed and expected gust speeds, as well as the temperature, precipitation, and barometric pressure in your vicinity. All those pieces of information play a part in determining whether or not you should fly. If wind speeds are lower than 6 mph on average, that's a good start at determining it may be generally favorable even for beginners to fly. If the gust speeds are more than 6-7 mph above the average speed (no matter how low the average speed), then you're generally much more likely to be in for a bumpy and/or dangerous flight. Generally, flying in any average speed more than 10 mph is going to be uncomfortable and/or dangerous as a new pilot. There are situations in which higher winds are safe, especially at the beach where the laminar airflow keeps gusts to a minimum, and it can potentially be comfortable to fly even when the wind is blowing 14 mph average at the beach (because gusts will typically only be a few mph more). If you fly inland, though, where there are obstacles that can produce rotor, anything more than 10 mph wind can produce really rough air downwind of the obstacles. Serious turbulence and rotor behind obstacles can exist up to ten times as far downwind, as an obstacle is tall (that is, a 100' tall obstacle can create rough air 1000' downwind!). Flying behind (in the lee side of) hills, trees, buildings, and other tall objects in heavy wind, can be extremely dangerous, even for experienced pilots. Even in light wind, the Venturi effect over the top of a hill can lead to faster moving air currents, and to a washing machine tumbling effect on the lee side of the hill. Be aware of any obstacles in your upwind path (where the wind is coming from), and avoid the generated rotor. As a new pilot, USPPA recommends that you don't even kite your wing if winds are 12 mph or higher.

Thermal Activity:

It's not just wind speed you need to watch out for. Unless it's completely overcast, you should expect the sun's rays during the day to heat up buildings, blacktop, brown fields, and other spots on the ground. This causes invisible columns of air, called thermals, to rise. During the day, thermals can become powerful enough to carry a paraglider pilot all the way up to cloud base in just a few minutes. Free flight paraglider pilots accept the risk and potentially violent conditions which thermals can produce, in order to fly upwards without a motor (they also launch from mountain tops in heavy wind, to soar the ridge and gain height). Paramotor pilots do NOT need to put themselves in the way of the likely dangers caused by thermal activity. New paramotor pilots should only plan on flying during the last few hours of the evening, or the first few hours of the morning. Those are times when thermal conditions will be most benign. Be aware that morning hours very often mean that dew will be on the ground, and your wing will get wet. If you abort an early morning launch and need to reset, that can mean having to lift an extraordinarily heavy wet wing, and one which doesn't fly as safely in the air until it's dried out. During the day, thermals can cause dangerous upward moving columns of air that can fold your wing in half if you fly part of your wing through them. Thermals can also force you into dives, spins, stalls, or other various situations that are extremely hazardous, as you enter and exit them (your wing will pitch up on entry, and dive downward on exit). Until you've learned how to handle pitch control, collapses, spirals, and stalls in an SIV course, and through extended training/experience, it's much better to avoid thermal mid day flying entirely. On the ground, thermals can be deceiving. It's possible to feel like there is no air movement at all during the day, because thermals move the air vertically. If you see large billowing cumulus clouds during the middle of the day, do not fly, as a beginner. You can often track where thermals may be - they generally originate at some heated source on the ground, and top out at a cumulus cloud base (where the water vapor reaches its dew point). They tend to angle upwards from source to cloud base, as they're blown downwind by the prevailing atmospheric wind currents. You'll get used to where they regularly form at your local flying sites. Another indication of thermals is regularly shifting wind direction. If the winds are low on the ground, and the wind appears to be changing directions, especially if it's shifting in 180 degree turns, that's often caused by thermals sucking the air upwards in their direction. Multiple local thermals can appear to shift wind direction regularly 360 degrees, as they alternately pull more air mass in their direction, to feed the upward moving column. Another great indication of thermal activity is soaring bird activity. If you see vultures or hawks circling with outstretched wings, you can be nearly certain they are following a thermal elevator upward. As a paramotor pilot, it's safest to just limit your flying to the first or last 2-3 hours of the day, in the beginning of your learning experience. Many paramotor pilots never fly mid day in all their experience, because doing so truly adds a tremendous potential for dangerous situations, and for some pilots, it's simply not pleasant to fly in those conditions. Making use of the extra half an hour after sunset in the evening and the extra half an hour in the morning before sunrise, using a strobe, is a great option. Those times often provide the calmest air to fly in, but be aware that no-wind forward launches are the most difficult to pull off, as they require the longest and fastest runs. Landing in absolutely no wind also requires the greatest skill and control, as you have no wind to fly into, to slow your descent. If you do fly at the very end or beginning of the day, just make sure to fly legally with a working strobe visible for 3 miles, and be sure that you can see your surroundings and the ground well enough to land and to avoid obstacles in the lower light.

Barometric Pressure:

When evaluating weather, HIGH pressure systems generally provide the best conditions for flying. You'll typically find the worst and most unpredictable patterns exist in low pressure systems. You should expect more storms, and more gusty conditions when pressure is low. You can watch pressure systems move across the country to get a general idea of how the weather will trend. Be sure to look at the pressure in your Windmapper.com overview, every time you fly. Lower pressure is typically associated with less stable air (nastier flights).

Temperature:

Be aware of temperature. High 'density altitude' produced by high temperatures, and exacerbated by high humidity, can make the air you launch in much thinner. In high density altitude (when it's hot) you'll have to run farther and faster than normal, and the flight characteristics of the wing will be similar to flying at a very high altitude. A density altitude of 5000 feet means that you'll be taking off in the same conditions as on a 5000 foot mountain top, or for example, in Denver Colorado. It's much more difficult to operate your wing, and you won't get nearly as much lift in those types of hot and humid conditions. Launching and landing will require more skill. Using a bigger wing and a more powerful engine can be helpful in high density altitude conditions. If you're flying in hot and humid weather with a heavily weighted small wing, with a low powered engine, you may not be able to get off the ground. Be aware that large variations in temperature, with strong differential heat gains during the day are more likely to cause thermal activity (and not just in summer, you can experience strong thermals even in winter). You can find a temperature prediction in your Windmapper.com summary.

Winds Aloft:

Another important piece of information to look up before you fly is the winds aloft speeds. High winds aloft typically indicate conditions that can be problematic, especially if you're going to fly high. It's possible for fast-moving air in the upper atmosphere to swirl down and effect wind in the lower atmosphere, even if the average wind speeds near the ground look perfectly calm. Remember that there's nearly always a wind gradient as you move from lower altitude to higher altitude. If you take off in high wind conditions that are barely flyable near the ground, it's very likely that you will end up flying backwards up high. You should never fly in conditions which force you to fly backwards unintentionally. Even at the beach, or in conditions that are pleasantly windy without being gusty, be aware that the wind gradient will mean much stronger winds, even just a few hundred feet up. You never want to be in a position in which you have to fly down low over trees or power lines to land forward safely. Also, be sure to look for changes in wind direction at different altitudes. A change in vector at various altitudes can indicate wind sheer - a condition in which layers of wind shift abruptly, causing tremendous immediate speed and flight path changes as you cross between them. Hot air balloon sites tend to provide useful detailed info about air speed and direction at specific altitudes (this author prefers www.blastvalve.com/weather/). Checking the wind speeds aloft takes just a few seconds of your time, and it provides fantastic insight into the larger atmospheric picture. If winds aloft are dramatically high, don't fly, especially if the other information available leads to a questionable outlook.

Radar and Storms:

Be sure to check the radar every time you fly. If there are storms within even 40 or 50 miles, they can be preceded by violent gust fronts. You do not want to be up in the air if a gust front is anywhere nearby. That calm before the storm can whip up instantly into 20-60 mph swirling winds on the ground, as one front passes over another. Flying through rain can also lead to a degradation of your wing's performance in the air. A wet wing responds sluggishly, and is much easier to stall. Look for signs of large storms on the radar, and if you can actually see towering storm clouds anywhere nearby (visually, at your flying site), do not fly. If you're in the air, and you see signs of an unexpected nearby storm or a gust front moving along the ground, land and unhook immediately. You can find storm and precipitation indicators on your Windmapper.com overview. Heed them well.

Fog:

Be sure to check for signs of fog. The 'Temperature Dew Point Spread' available at www.usairnet.com is a great indicator of the potential for foggy conditions. Low single digits indicate a very high likelihood of fog. If fog forms after you launch, you can find yourself in a dangerous situation. One quick check online, especially when flying in unfamiliar locations, can save you a world of trouble.

Actual Conditions VS Predictions:

It's important to understand that any weather website, or other source which offers predictions, can be wrong. **DON'T TRUST ANY PREDICTION MORE THAN 3 DAYS IN THE FUTURE.** It's more likely that predictions more than 3 days away are likely just historical averages. Don't make any decision to fly without checking conditions right before flying. Often, different sites will provide conflicting or different information. Windmapper and Windy, for example, typically provide different average and gust speeds, but you'll generally see that they follow a similar trend. If it looks like winds are going to be blowing much stronger on a given day, even if the numbers don't match up, that trend can likely be expected to be generally true. You'll get used to the different ways each site generalizes specific speed measurements. If you see radically different predictions from different sites, it could very likely mean that even the professionals don't know what to expect from a volatile set of circumstances that might follow any of several different models. Weather isn't entirely predictable, especially within the tiny micro climates in which paramotors

fly. Even with all the fantastic tools available online, predictions are never as valuable as actual OBSERVED CONDITIONS. Looking at hourly data from your local weather station will give you a critically important view of what's actually happening in the air around you, right up to the current moment (you can find all these tools, such as www.usairnet.com/weather/conditions/?station=KDYL at www.ppglessons.com/links.html). The best option you have as a beginner is to find a community of experienced local pilots you can talk with about weather conditions, every time you fly. Whenever possible, have an experienced pilot be your 'wind dummy'. They can make the decision to fly, go up in the air themselves, and tell you how things actually feel. If they tell you not to fly as a beginner, follow that warning. Experienced pilots who are able to pilot actively (always keeping the wing in a position directly overhead), can make it look easy to fly in rough conditions, but as a new pilot, those same conditions can be uncontrollable.

In Short, Do This, At Least, Every Time You Fly:

The process you should follow every time you go to fly, at a minimum, is this: check windmapper, windy, winds aloft, and radar. Look for good average wind speeds, acceptable gust ranges, low wind speeds aloft, radar (and weather predictions) that show no dangerous storms in the area, high pressure that indicates generally stable and favorable conditions, and low temperatures that indicate low density altitude. Only fly during the last two or three hours of the evening, or the first few hours of the morning (remember, evening is preferable because grass won't be wet from dew). Follow the recommendations of more experienced pilots, and have a wind dummy fly first, if possible. Don't fly in foggy conditions.

It Gets Easier With Experience, Be Safe:

You WILL get better at judging weather conditions. Your understanding and intuition will improve as you fly in various weather situations. Your piloting skills will also improve, so that you can accept a much wider window of weather to fly in. You may become comfortable flying during mid day (always with a reserve, and only after significant experience, SIV training, etc.). But in the beginning, always choose to play it safe. Weather is one of the most dangerous potential factors in flying a paramotor. After hundreds or thousands of flights, you'll get used to evaluating conditions immediately, because you will have seen similar conditions many times before. A pilot who is comfortable maintaining directional control and flying with half a wing collapsed, who is perfectly happy flying in the turbulent conditions that can cause such a situation, is far more capable of flying during mid-day without distress. A pilot who regularly lands with the engine on, and who can naturally maintain perfectly consistent altitude while flying through heavy lift and sink conditions, directly above the ground, is much more capable of landing during thermal conditions that could slam an inexperienced pilot into the Earth on final approach. A pilot who can actively avoid surges, stalls, and spins caused by violent conditions, is also going to be much more comfortable flying in slightly uncomfortable weather that may make a new pilot not only frightened or even frantic, but also genuinely out of control and unsafe. A pilot who has experienced difficult launches due to high density altitude, will know to avoid that condition in the future. Follow the guidance of pilots in the area who can help you determine what is safe. Remember that combinations of potentially dangerous conditions can add up to a much stronger likelihood of trouble. For example, flying mid-day, with storms nearby, in heavy or gusty winds on the ground, with high winds aloft, in hot and humid (low density altitude) conditions, in low pressure, all at the same time, will almost certainly ensure a nearly 100% chance of serious danger.

Treat weather with respect, it can kill you while flying. At very least, bad weather choices can make for thoroughly unhappy experiences in the air. Wait to fly another time if you are at all unsure!