

AirSpace Season 2, Episode 1

Get Off My Cloud

Nick Partridge:

Have you ever heard of nephophobia?

Emily Martin:

What is it?

Nick Partridge:

It's fear of clouds.

Emily Martin:

Does it mean you can't go outside or you just don't look up?

Nick Partridge:

I think maybe you just carry an umbrella everywhere you go.

Welcome to season two of AirSpace. We're so glad to be back with a brand new season. I'm Nick Partridge.

Emily Martin:

And I'm Emily Martin. Matt Shindell is away this episode, but he'll be back for our next one.

Nick Partridge:

Today we're going to talk about something pilots try really hard to avoid: cumulonimbus clouds.

Emily Martin:

Otherwise known as thunderstorms. And you really want to avoid flying through them. You really, really want to avoid ejecting out into them.

Nick Partridge:

We'll revisit one pilot's harrowing tale of doing just that.

Emily Martin:

We'll also talk to a Cloud Specialist, Elisa Murillo, to help us understand the science of storms.

Elisa Murillo:

A good way to think about it is that all storms are clouds, but not all clouds are storms.

Nick Partridge:

And we'll hear from an expert pilot, who navigates around clouds regularly, and knows firsthand how serious they can be.

Lukah Weslow:

Flying into clouds, for pilots that aren't trained, is one of the leading causes of accidents, especially in small, personal airplanes.

Emily Martin:

Flying, and falling through clouds. That's coming up next on AirSpace, from the Smithsonian's National Air and Space Museum, with support from PRX.

Let's start with the story of a guy who, shall we say, had a turbulent experience with a cloud. And not just any cloud, a thunder cloud. Nick, you know this story pretty well.

Nick Partridge:

This is the story of William Rankin, who almost drowned in midair. So, it was not a dark and stormy night, it was a warm, sunny summer's day. It was July 26th, 1959. Rankin was flying from Massachusetts to South Carolina and a storm cloud, a big, angry, anvil-shaped cumulonimbus, starts to form ahead of his airplane. So he does what you would normally do, and pulls up to try and fly over it.

Emily Martin:

We've experienced this on a commercial plane, right? Where you hit some turbulence, and so the pilot either goes up or down to try and kind of get around it.

Nick Partridge:

Right. It's kind of the normal M.O. As he's climbing, and as he's passing through 47,000 feet, he hears all of the bad engine noises.

Emily Martin:

All of the things that you don't want to hear-

Nick Partridge:

Yeah.

Emily Martin:

Say, in your car, but at 47,000 feet.

Nick Partridge:

Right. And then, to make matters worse, the warning light that says "Fire."

Emily Martin:

Okay.

Nick Partridge:

Yeah. He's going to need to get out of that airplane. Which, if you think back to the episode we did, "Bailing Out," under optimal circumstances, bailing out of an airplane is not easy. William Rankin, he's north of 47,000 feet. So he comes out of the airplane.

Emily Martin:

Ejects from his air force jet?

Nick Partridge:

Yep. Things to know: He does not have a pressure suit on.

Emily Martin:

So no pressure suit. We're accustomed to flying almost this high in a commercial jet, but those cabins are pressurized.

Nick Partridge:

Almost this high, but still 50% lower.

Emily Martin:

Sure.

Nick Partridge:

It's big. Like he's probably 20,000 feet higher than the top of Mount Everest and, as you may have heard over the years, it takes weeks to get to the top of Mount Everest so that the altitude doesn't kill you.

Emily Martin:

What's that like to be ejecting out of an airplane and you have no compression suit?

Nick Partridge:

"Sucks real bad," is the scientific term. Instant decompression shock, terrible, terrible pain, eyes start bleeding, nose bleeds, ears bleed, his stomach distended immediately to the level of like, third trimester. And all of this was because of the pressure difference. It was negative 70 when he got out of the airplane.

Emily Martin:

So, instant frost burn?

Nick Partridge:

Frost burn.

Emily Martin:

Frost bite.

Nick Partridge:

Left glove stayed with the airplane, and so his hand immediately froze, to your point of frost burn. Feels like fire, on your face, and on your neck, and on your exposed hand, and the only blessing that you can look forward to is that all of the parts that feel like they're on fire will be numb very soon.

Emily Martin:

Great. So this is a rosy picture. So what happens next?

Nick Partridge:

He's got his parachute on, but it's not open. He's burning, he's freezing, he's bleeding and he's headed towards this cloud. The other thing to know is that he's spinning, and he is spinning so fast that the G-Forces keep his arms and legs in a spread eagle position, and he cannot move them no matter how hard he tries. He can't reach his oxygen mask.

Emily Martin:

Oh, he has an oxygen mask? But he just can't get to it.

Nick Partridge:

Right. Can't reach it.

Emily Martin:

Okay, so then he falls into the thundercloud?

Nick Partridge:

He does hit the cloud, and, fortunately, he puts his oxygen mask on his face. So he's got three to five minutes of oxygen. It's designed to get him to a point where his parachute will open. It's on an automatic switch, so it'll happen at about 10,000 feet, when he's low enough to breathe. He's already thinking, "When I get to the ground, the guys are going to love this. I'm going to be able to say that I came out of my airplane at 45 or 47 or 50,000 feet, and it was terribly painful," but he's already thinking, "Oh, I'm going to live. It's going to be fine." And then his parachute does open. Unfortunately, it was not sensing a pressure difference because it was at 10,000 feet, it was sensing a pressure difference because he was in a storm cloud.

Emily Martin:

So, the parachute opened way too soon.

Nick Partridge:

The parachute did not open when it was supposed to, that is for sure.

Emily Martin:

So what caused that shoot to open? We asked a meteorology scholar, and expert in clouds, to help us with that one.

Elisa Murillo:

A good way to think about it is that all storms are clouds, but not all clouds are storms.

Emily Martin:

Meet Elisa Murillo.

Elisa Murillo:

So basically thunderstorms are made up of cumulonimbus clouds. The pressure inside the cloud will be much lower than what it is outside of the cloud. That also has to do with the precipitation, the water droplets, that are in the cloud, as well.

Emily Martin:

So essentially, this zone of lower pressure inside the cloud would make the pressure sensor on his parachute think that they were at a lower altitude than they actually were?

Elisa Murillo:

Correct.

Emily Martin:

He was in a place where the pressure was such that it tripped that switch.

Elisa Murillo:

Yes. Where you have a center of low pressure, you have air rushing into that area and then shooting upwards into the atmosphere.

Emily Martin:

These updrafts and downdrafts, how fast do they typically move?

Elisa Murillo:

Specifically in storms, that's where you would find the fastest updrafts. You can have updrafts between 10 meters per second to 50 meters per second, which is around 20 miles per hour to a little over 100 miles per hour, which is extremely intense for somebody to be flying through.

Emily Martin:

Nick, it sounds like the updrafts and downdrafts that are happening inside the storm cloud are really important to this story.

Nick Partridge:

The last thing that you want is to hit the ground at full speed. The second to last thing that you may want is to go back up.

Emily Martin:

When you're going down.

Nick Partridge:

Because that's not solving your problem at all.

There's a phenomenon called "Cloud Suck." If you've got any sort of a wing apparatus or anything, that'll catch the air, say a parachute.

Emily Martin:

Or like a parachute?

Nick Partridge:

Like a parachute, hypothetically. He senses that he's moving in the wrong direction.

Emily Martin:

So he's going up now, instead of down.

Nick Partridge:

From there, a absolutely historic odyssey of pain and suffering ensues.

Emily Martin:

Wait, more pain and suffering than the decompression, and then the bleeding, and the frost burn?

Nick Partridge:

We have yet to begin.

Emily Martin:

Excellent.

William Rankin was falling through this thunder cloud, and as he was falling, he then gets sucked back up, and then he gets dropped back down, again and again. Elisa, what was going on inside that cloud to create this kind of washing machine effect?

Elisa Murillo:

Updrafts generally aren't strong enough to be able to push up an entire human, so it was likely a lot of the effects of the parachute being able to loft that up as well. And then him sinking after he was out of the area of the strongest updraft.

Nick Partridge:

He still has his helmet on, which was good, because the hail at this level of the thunderstorm has been described like the sound of baseballs hitting the helmet at hundreds of miles per hour.

Elisa Murillo:

Likely what he was seeing was either these larger hailstones that had spikes on them, or he was seeing the really, really beginning stages of hail, that look like lots of ice shards before it becomes round. So, those are kind of the two options that I would envision he could have experienced, given his description.

Nick Partridge:

Imagine being literally in the storm cloud.

Emily Martin:

How's the parachute?

Nick Partridge:

Yeah. So his concern at this point, as he's being battered just black and blue with hail, is, "I hope nothing goes through the parachute," like shrapnel from this hail, like jagged ice. Parachutes don't generally do great with things like fire and lightning. You know that rule where you see a flash of lightning, and then you count-

Emily Martin:

Oh, yeah. To find out how close-

Nick Partridge:

You see the flash, and then you count many seconds still the thunder. So, there's no difference between the flash and the boom.

Emily Martin:

Oh, there's flashing.

Nick Partridge:

There's flashing, yeah. The boom is your entire existence. It's the birth and death of the universe, and more specifically, your eminent demise. And lightning, instead of being these elegant ribbons of electricity that are happening somewhere else, are feet-thick and in these blinding, blue sheets. And then, because of the light, everything goes dark and you can't see a thing because of how overexposed your eyes are. So now, you're burning and frozen, deaf from the thunder, and blind from the lightning,

Emily Martin:

Great.

Nick Partridge:

Continents of lightning.

Emily Martin:

Continents. Elisa said, "it was unbelievable that William Rankin wasn't struck."

Elisa Murillo:

Yeah, it is absolutely incredible that he was not struck by lightning because flash rates in cumulonimbus clouds and thunderstorms are incredibly fast. There are two different types of lightning: there are in-cloud lightning, and then cloud-to-ground lightning. And so the amount of cloud-to-cloud lightning is significantly higher than the lightning that hits the surface. So yeah, it's very surprising, and very lucky for him, that he wasn't harmed by lightning while he was being thrown around in this cloud.

Emily Martin:

I think what makes this whole story so interesting to me is, I generally think of clouds as these pretty static things that maybe only get blown around a little bit by the wind sometimes, but I'm always thinking of like big, puffy clouds and like a really nice, blue sky. And yeah, you see the storm clouds, but they're still clouds, they're totally harmless, right?

Elisa Murillo:

So there are many different types of clouds.

Emily Martin:

If he'd fallen into any other kind of cloud, would this story have been as dramatic?

Elisa Murillo:

Absolutely not. Had it been any other cloud, he would have only experienced the things that he did from each ejecting at that altitude. So, the frostbite and the decompression, him hitting hail, and other water droplets, and lightening, and thunder, none of that would've happened had he fallen outside of that cloud, or into many other types of clouds.

Emily Martin:

Are there other kinds of clouds that can form storms?

Elisa Murillo:

Absolutely. If we're talking about winter storms, those are generally much more shallow, meaning they don't go as high in the atmosphere. If we're talking about hurricanes, those are also types of storms. Those are made up also of cumulonimbus clouds. And like an overcast day, where it's just steady rain all day, kind of Seattle weather, there are particular types of clouds, that are not cumulonimbus clouds, that do that kind of rain.

Emily Martin:

Do you ever get like random text messages from your friends and family that are like, "What does this cloud mean?"

Elisa Murillo:

All the time. I get those questions all the time.

Emily Martin:

We're going to take a short break. When we come back, we'll talk with Lukah Weslow, who describes how pilots train for hundreds of hours just to master clouds.

It's been over 59 years since William Rankin saw a thundercloud and flew above it, and then ended up free falling through a nightmare. Technology and design have both come a long way since then. So, we thought it would be useful to talk with somebody who's flying today, in 2019, to find out if anything, at all, has changed in the way pilots think about clouds. Lukah Weslow is a commercial pilot for a regional airliner.

Lukah Weslow:

When we first learned how to fly airplanes, we do so almost exclusively by looking outside, flying not dissimilarly to a bird, and as you move on, that's when you learn how to fly as an Instrument Rated pilot, which is when we fly in clouds.

Emily Martin:

By "instrument flying," you're really talking about moments when you're flying a plane where you can't actually see anything.

Lukah Weslow:

Yes. All that "instrument flying," for us, means that we're using just the instruments on our panel in the cockpit to help us navigate deciding whether a cloud is a good cloud or a bad cloud. Am I worried about a thunderstorm maybe in that cloud? Maybe we're worried about ice, and is it the type of ice that airplane can safely fly in?

Emily Martin:

So can you talk a little bit about the training you've received on things like identifying weather, and clouds, in particular.

Lukah Weslow:

Accidentally flying into clouds, for pilots that aren't trained, is one of the leading causes of accidents, especially in small, personal airplanes, and that's why we spend 40, 50, 60 hours of training just specifically to learn the basics of cloud flying, and then gain hundreds of hours of experience beyond that. As part of my freshmen classes, we actually took almost a full year on just meteorology basics, the meteorology, how the sun heats the earth and makes the winds form. We get into what causes different types of clouds, what the different types of clouds are, and as we get more comfortable with it, we move on to how the different types of clouds affect the airplanes that we fly. So it's really the foundation of the training was freshman year of college, and then obviously we get tested on that as we move up from the most basic level of private pilots, to what we call commercial pilots and airline transport pilots.

Emily Martin:

So there's this amazing story about the pilot William Rankin, who ejected from his plane and got caught up in this storm cloud that had loads of terrifying sounding hail. Now being from the Northeast, I'm really accustomed to frozen water, in a lot of different forms, but hail is not one of them. I've only ever really seen hail that's really tiny, none of this golf ball-sized hail. What is it about hail that you're really worried about when you're inside of an airplane?

Lukah Weslow:

So when we are driving around in our airplane, we're going 300 extra miles per hour through the air, so you can take any object that's floating around and add 300 miles per hour to it. Tiny, little pieces of ice, they can impact our windshields, or engines, or the front of the wings, and just like they dent a car, they would dent the front of the airplane. Although, I don't believe there's ever been any serious accident in a passenger airplane related to hail, in a small airplane that could be pretty devastating, like a little four passenger airplane, a little propeller plane. And that's why we avoid thunderstorms in the first place.

Emily Martin:

And what about lightning?

Lukah Weslow:

Lightning, that's probably one of the scariest sounding to a passenger, "Oh, I get hit by lightning."

Emily Martin:

Yes. It sounds very, very scary. Very scary.

Lukah Weslow:

And it's probably one of the lesser concerns for us, as pilots. Conveniently, the airplane's totally covered in metal skin, and electronically insulated from any static charges that you might accrue while you're flying. So if you do get hit by lightning, which is a thing that happens quite a bit, especially in the summer, the lightning tends to flow around the airplane and continues to the ground, usually without anyone on the airplane or even the pilots being aware that it happened. Sometimes, after you land, you might see a little, black spot where the actual lightning hit, and if you go down to the back of the airplane, you'll see a little black spot. But that's just where it went in and went out, just like how they say to be safe in a thunderstorm, you should sit in your car.

Emily Martin:

Oh my God. Wait, so would you feel the strike? Not like electrically, like a shock, but would you feel a bump?

Lukah Weslow:

I've heard that sometimes you do sort of hear a pop, but oftentimes you have no idea. It's-

Emily Martin:

You're telling us that lightning striking the plane shouldn't freak us out?

Lukah Weslow:

Absolutely should not.

Emily Martin:

Oh my gosh. That's going to take me some time, but I believe you. I trust you.

Lukah Weslow:

I'm not worried about it day to day.

Emily Martin:

So Nick, Lukah makes it pretty clear that all pilots take clouds super seriously, even if they keep it together. Can you now take us back to William Rankin, because he's still up close and personal with a pretty terrifying thundercloud, and he's being kind of pulled up and down, all over the place in this cloud, and he's not having a super great time.

Nick Partridge:

When we last saw our hero, he was battered from the altitude, battered from the cold, the parachute collapsing on his face, like a wet blanket, the air so full of rain that he nearly drowns in midair. He does get seasick and throws up several times, even though he is a Marine. Miraculously though, William Rankin survived this.

Emily Martin:

Wow.

Nick Partridge:

He does get through the cloud, and he's only a couple of hundred feet above the ground at this point. Still had that helmet on, remember, which is good, because he hit a tree on the way down. Yeah. The final indignity of the storm.

Emily Martin:

It's not funny.

Nick Partridge:

Yep. Yep. It's funny because he lived. I guess, if he can talk about how the hitting the tree was the final thing.

Emily Martin:

Was he seen landing on the ground? Was he just found there in a pile of like limbs? Like what, how did he, I mean-

Nick Partridge:

He had to do a search to find a road, and then people didn't pick him up because he looked so terrifying. Eventually someone did pick him up, and they didn't take him to a hospital, they took them to a country store because-

Emily Martin:

Did he get to a hospital?

Nick Partridge:

Eventually, but he had to call his own ambulance.

Emily Martin:

That's great. That's great. Well, I suppose it's the fifties, it's not like he had an iPhone in his pocket.

Nick Partridge:

We have all of these wonderful details because Rankin wrote an autobiography about, well, his life, but really this one 45 minute chunk. It's called, "The Man Who Rode the Thunder."

Emily Martin:

Riding thunder sounds like maybe it could be kind of cool, but this experience that William Rankin had doesn't actually sound like a good time.

Nick Partridge:

Yeah, and two things that worked throughout this entire scenario: his helmet, and his watch. He bailed out at exactly 6:00 PM.

Emily Martin:

What time was it when he landed on the ground?

Nick Partridge:

Exactly 6:45.

Emily Martin:

Oh my gosh. Which has got to be the longest and shortest trip of his life.

Nick Partridge:

Yeah. If we made this episode 45 minutes, it would feel really long. Now imagine you're listening to it in the most terrifying environment imaginable. He was relieved to find out later that it was one of the most severe storms ever on record for the East Coast.

Emily Martin:

Where do you find these stories?

Nick Partridge:

I've heard this story around. I mean, it's pretty outlandish, so people tell it like you tell stories that aren't yours. But, it is also in a book that I got for Christmas called, "The Cloud Spotter's Guide," that is the science, history, and culture of clouds.

Emily Martin:

Okay.

Nick Partridge:

It's one of the early things that they use to illustrate that, even though clouds are very cheerful, please do not mess with them.

That's it for this episode of AirSpace. Follow us on Instagram @AirSpacepodcast. All of our photos are curated by Emily.

Emily Martin:

AirSpace is produced by Katie Moyer, Jocelyn Frank, and Lizzie Peabody. Mixed by Tarek Fouda. Special things to Laura Krantz, Jason Orfanon, Genevieve Sponsler, John Barth, and sound recordists Huggy 13 Ear, Robinhood 76, Inspector J, Timber, and Alonz10D.

Nick Partridge:

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Emily Martin:

William Rankin totally redefined Cloud Suck.