Topic 3c - Part 2: High altitude balloon measurements - In more depth

So I recognize this. This is a weather balloon that's a very standard type, isn't it? Tell me about how these are used.

Yes. We're using this type of balloon to make short missions. So we use it for a payload, with the weight of the payload is between two kilograms to four kilograms. And the profile of this type of balloon is as ascent between 35 kilometers to the 25 kilometers, yes?

And the ascent is nearly five meter per seconds, the speed. And after the balloon burst, and we have a descent and a parachute around one hour. After we recovered the payload and parachute, and something like this.

So it's very simple, isn't it? Because this balloon is very stretchy. So as it goes up, it's carrying some instruments. But it gets bigger, and bigger, and bigger, and bigger. And at some point it gets so big, it bursts.

Yes. So at first, you have this volume is nearly five cubic meters, and the diameter is nearly 1.5 meter to 2 meters. And just at the moment, when the balloon burst the diameter is around 10 meters. So it would fill this space.

Yes. 10 meters, the diameter. It's very big.

And then tell me about what it's carrying. Because these are instruments that they're sending their location. But they're not sending data. It's all carried, and then you have to go pick it up.

We pick it up, and we receive the data. And we analyze the data. So the payload is often counter particle for ozone or greenhouse gases. We use radiometer to analyze infrared. It's really for science, and for new instruments, and really light instruments.

So it can only carry a small amount.

Yes. The sizes like this, yes, and the weight is yes. Maximum is four kilograms, because we have to respect the International Civil Aviation rules. So it's four kilograms maximum, and it's enough, yes.

In lots of places around the world, balloons just like this are sent up twice a day, all around. It's an amazing form, isn't it? All around the world. And that data goes into weather models now.

Yes, it's serious.

But balloons get more sophisticated than this. Why don't you tell me about the one behind us

here.

Yes. This one is really sophisticated. It's to track cyclone. With this one, we want to analyze the eyes of the cyclone. So you want to track one. So it's very difficult to have a good trajectory to find the cyclone.

Because these are very high winds. It's a very dramatic situation.

Yes. This is actually very close to the water.

It's very close to the water, around 10 meters above the sea. And we analyze that surface, yes? And the wind surface, too.

So it held-- it's like a kite.

You have a rope, yes. Like a kite surfing.

They don't use very much power, do they? They're very efficient and small and light. So they've got-- they're better than an aircraft, for example?

Yes. It's better than an aircraft, because you can go to the cyclones. And to understand the influence of the surface in the boundary layer. And to understand the influence of the lower boundary layer, in the cyclone.

As the balloons get bigger, the things that they carry get bigger as well. So what sort of things can they carry, the big ones? They carry a really, really small payload. It's nearly 30 kilograms. Just the 30 kilograms.

So you've got some payloads--

I can show you another payload.

Let's have a look at the other one.

OK. But it's not the same balloon. It's a zero pressure balloon. So it's really big balloon, and you can carry the payload. And the weight of the payload is around 1 tons. OK.

So this is what would be hanging off the bottom of a very big balloon?

A very big balloon, yes. And what weight could it carry?

It can carry the payload around 1 tons.

So it's huge.

Yes. The weight of the balloon for carry this is nearly 1 tons of polyethylene. Very thin, it is a 15 micrometers. At float, it's around 150 meters.

So a balloon that is 150 meters across.

Of diameter. Yes.

Carrying that.

Yes.

That's a big balloon.

Yes. It's a big balloon, yes.

But it works. It gets to places that people can't go. So what have we got here?

OK, here this is flight change for this type of balloon. So we use it just under the balloon, this type of parachute. And the surface is between two to three meters.

So it's a very simple parachute.

Very simple, oh yes. It's a really simple. It's simple. It's a parachute for drone. So yes, very simple one. It's a French one. And just between the balloon and the parachute we put this. This is a separating system, because we want to release the balloon when it burst.

You have a piece of balloon, piece of latex. So we don't want that.

So you have the, once it's burst--

We could. Yeah. And we use this. But it's very simple. You are like this, OK?

Yeah.

And when the balloon burst, we do this. Click. See, click. And after we get here, and you release the balloon.

And the string is released.

Yes. OK. It's really light. It's 100 grams and it's for release the balloon.

So it's a really simple way of cutting a string. But it hasn't got scissors. Is it heat?

No. Yes, I see. It's the heat. But you can see.

So it heats up and melts the string.

Yes.

You have something here and here. You have a small rope, and we heat the small rope. And we open these two pieces.

Yes. And it's released. OK.

So then these two bits.

Yes. This is very simple. It's a meteorology phone. It's for tracking the balloon during the flight. Just that.

So you can sit on the ground with a computer and you know--

You see, yes.

And you can see where it's going on the map.

Yes.

You can't control it. But you can follow it.

Just to follow, just to follow. And for the recovery. Yes. And after, for the recovery, we use this. It's the system of tracking. Yes. We used two system. GSM, so like your phone, your mobile phone. And the other one is origin system. So you have two systems.

From satellites.

Satellites, yes. It's really nice to use it when you have no GSM, no mobiles. So You use the satellite system. And it's for the recovery. Because sometimes the price of the payload is nearly 10,000 of euro.

Really? So you want to get it back?

Yeah. We want, and the scientists, too.

Right. So you have to drive out and just use the tracker information.

Use the tracker and your mobile phone.

And you look, don't you? Because I've got this. You're like is it over there? Is it? It's somewhere within 100 meters.

Yes, yes.

And we have to find it.

And use your mobile phone with the map. And you have the position in real time.

So it's like a treasure hunt.

Yes.

You get your weather data back, and then you can take it and analyze it.

It's really nice to find the treasure.