

Transcript

Where does outer space begin?

5 minute discussion between Jem Stansfield, Dr Yani and Dallas Campbell.

DALLAS: So I want to talk about the edge of space. As far as I'm concerned, there's the edge of space and then there's "the edge of space." So we're going to play with this, talk about this definition a little bit. Can I just say off the offset, I apologise now for the quality of my drawing, particularly the fact that half of it's in feet and half of it's in kilometres.

DR YANI: quite the artistic talents, though. Pretty good.

DALLAS: So here's the first thing, which I think we can all agree on. There is no line of demarcation naturally where space begins and then there's Earth's atmosphere is.

DR YAN: Yeah, I guess the air molecules gradually get thinner, and thinner, and thinner until way up here there's not very many of them all. But there's no really obvious boundary.

DALLAS: No, exactly.

JEM: Which you kind of see, like to some extent. You do see a bit of a haze, if you see on here, as it goes out. And I think of that as it gets fuzzier and fuzzier. But I'd say maybe there's a cutoff pressure. And say we're down here, and there's an ambient pressure of one bar. Up there, it's like one-hundredth of a bar. And I think that's pretty much the edge of space.

DALLAS: It seems to me that the definition is sort of constantly shifting. In the '50s, '60s, 50,000 feet was considered edge of space simply because nobody had really explored there. So it was very much the unknown. It was the edge of space. And then of course 10 years later, you got Concorde at 60,000 feet plus. And I think clearly would nobody say that that is a spacecraft.

JEM: Yes.

DR YAN: Yep.

DALLAS: But then you get-- now, this is the interesting thing. Because you know, we sent a balloon up to just under 100,000 feet. There are certain high altitude aircraft like the U2 spy plane which are flying 90,000 to 100,000 feet. And that is very much a ceiling, as far as I know, of how high jets can fly. Because they need a lot of air in order to fly. At that kind of level, there is no air. That is the top of the atmosphere, surely, round about 100,000 feet.

DR YAN: Well, you can't say there is no air.

DALLAS: OK, not no air. But what I mean is—

DR YAN: Not enough to have a jet engine work.

DALLAS: Sure.

JEM: Yes, exactly.

DALLAS: And also, how high balloons can go. Presumably, there is a balloon ceiling.

DR YAN: I think so. Well, it's 30 kilometres, isn't it, if you want to go metric.

JEM: With a balloon, it's down to the fact it gets to a point where the density of the balloon, that's like the structure of the balloon and the gas within it, is more than the density of the air around it. At that point, it's no longer buoyant. And it's going to start to sink.

DR YANI: mean, you have to have a balloon. You have to have stuff outside the balloon to be basically pushing it up, molecules outside the balloon. So in some way, you've got to have a reasonable number of air molecules floating around outside to be able to lift the thing up.

DALLAS: And I've written-- I put edge of space, question mark, question mark. Only a handful of people really in history have ever gone that high. If you think about when you fly normally when you get in a plane, you're at 30,000 to 40,000 feet. So it's kind of triple that. However, I guess officially now space is considered up here. There's a 100-kilometre line of demarcation. It's called the Kármán Line. Although I believe NASA called space 122 kilometres. Other people will say 118. But it's sort of knocking around there.

DR YANI: To me, actually, it's the meteors that make the difference. To me, I think that's the sort of natural thing. It's not something that humans have imposed. If we get meteors here, it means that they're burning up because they're hitting the atmosphere. And so, to me that feels like the place where the atmosphere really begins, when stuff starts to burn up when it hits, and when natural stuff starts to do that as well.

DALLAS: Let me ask you this. Let me ask you this.

DR YANI: Yeah.

DALLAS: Do you think it is unfair or it is wrong to say "edge of space" in inverted commas at 100,000 feet or thereabouts in terms of what we talk about high altitude aircraft, weather balloon?

DR YANI: don't think I would say it. But I don't think it's unreasonable either. I'm maybe just a little bit more cautious about saying that sort of thing.

JEM: I feel as though there is space. There is the atmosphere. And as there is not a fine exact line between the two, then the edge of space can be as thick a line as you wish.

DALLAS: OK. Well, here's a good point. Clearly no one's saying like 10 feet above sea level is the edge of space. Although... But do you know what I mean? But that to me seems reasonable. There is a bit of scientific-- can I say scientific licence? There is artistic licence, perhaps.

JEM: It's almost to me a little bit like the Jaffa cake debate where Jaffa cakes were trying to get VAT knocked off for being a biscuit and saying it was a cake. And the judge said, if you showed that product to a child and asked them what it was, they would say it's a biscuit, and slung the thing out of court. And for me, it's the same sort of situation. If you show a child the pictures of you 100,000 feet and say where is it, they would say space. If a Jaffa cake is a biscuit, you have been to the edge of space.

To me, that pretty much sums up the situation.