



# LIFE IN THE CLOUDS



GRAVITY ASSIST



Podcast

1

00:00:01,920 --> 00:00:08,560

Did you know the smallest form of life can\h  
travel enormous distances? How do they do that?\h\h

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00:00:09,440 --> 00:00:17,840

How do microbes fly in the upper atmosphere? Hi,\h  
I'm Jim Green, Chief Scientist at NASA, and this\h\h

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00:00:17,840 --> 00:00:23,440

is Gravity Assist. On this season of Gravity\h  
Assist, we're looking for life beyond Earth.\h\h

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00:00:25,040 --> 00:00:29,200

I'm here with Dr. David J. Smith\h  
from the NASA Ames Research Center\h\h

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00:00:29,760 --> 00:00:35,440

and David is an astrobiologist. Welcome\h  
to Gravity Assist. Thank you so much,\h\h

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00:00:35,440 --> 00:00:40,720

Jim. I'm happy to be here. Let's start out\h  
with- what are we talking about? What do we mean\h\h

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00:00:40,720 --> 00:00:46,960

when we're talking about microorganisms and why\h  
are they so important in the search for life?\h\h

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00:00:46,960 --> 00:00:52,880

When we talk about microorganisms or microbes,\h  
we're really talking about small life\h\h

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00:00:53,680 --> 00:00:57,600

life's so small that you can't see it\h  
with your own eyeball. You know when,\h\h

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00:00:57,600 --> 00:01:06,080

uh, our Earth had microbes for four billion years\h  
or so and and survived many mass extinctions that\h\h

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00:01:06,080 --> 00:01:11,760

went on you know, perhaps that's what happened on the other planets and this is why we're looking for

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00:01:11,760 --> 00:01:17,840

microbial life on those planets. I remember when the discovery of microbes were found

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00:01:17,840 --> 00:01:24,080

at high altitudes. What type of microbes have we found? We see same kinds of microbes in the

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00:01:24,080 --> 00:01:29,440

atmosphere that you would see if you went outside and scooped up some soil, a representative sample.

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00:01:30,240 --> 00:01:36,800

The reason for that is maybe easier to understand if we just talk about how microbes move in air,

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00:01:36,800 --> 00:01:43,360

right. So if you were to sneeze and I were to microbiologically sample what's coming

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00:01:43,360 --> 00:01:48,000

out of your sneeze, more or less, it would be representative of the microorganisms

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00:01:48,000 --> 00:01:55,680

in your mouth. Now in the atmosphere, you could think of geological and meteorological processes

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00:01:56,400 --> 00:02:01,920

in effect causing the earth's surface to sneeze, and therefore the same signal we get in the

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00:02:01,920 --> 00:02:07,760

atmosphere is representative of what was on the surface. We see fragments of pollen and other

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00:02:07,760 --> 00:02:15,440  
pieces of biological debris in the atmosphere\h  
as well too. And you know, speaking of sneezing,\h\h

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00:02:15,440 --> 00:02:21,840  
anybody that suffers from seasonal allergies is\h  
acutely aware of pollen in the earth's atmosphere.\h\h

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00:02:23,280 --> 00:02:27,200  
You may not know that if you suffer from\h  
seasonal allergies, you too are an aerobiologist\h\h

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00:02:28,160 --> 00:02:36,240  
but that's just to say that you know we we have\h  
been impacted in a lot of ways by the movement\h\h

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00:02:36,240 --> 00:02:41,360  
of airborne microbes. You've done a lot of\h  
experiments not only from aircraft but from\h\h

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00:02:41,360 --> 00:02:46,240  
balloons too, can you give us a little overview\h  
about what you've been doing with those platforms?\h\h

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00:02:47,120 --> 00:02:52,640  
Yeah, so we used large NASA scientific balloons\h  
to get to even higher altitudes into the middle\h\h

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00:02:52,640 --> 00:02:58,480  
stratosphere, around 120,000 feet, where we can\h  
linger for days if not weeks depending on where\h\h

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00:02:58,480 --> 00:03:03,200  
and when we launch, which is just so exciting\h  
because of the kinds of science that we can do.\h\h

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00:03:03,200 --> 00:03:08,960  
And in most cases, we'll take the same types of\h  
resilient microorganisms that we've collected\h\h

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00:03:08,960 --> 00:03:14,080  
using NASA aircraft to those middle regions\h  
of the stratosphere and large NASA balloons\h\h

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00:03:14,080 --> 00:03:19,440  
to expose them to the environment and all those\h  
stressful conditions in a way that after the\h\h