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NASA

1
00:00:07,220 --> 00:00:12,600
When NASA prepares a spacecraft to fly to
a faraway planet to hunt for signs of life,

2
00:00:12,600 --> 00:00:13,430
it's important not to

3
00:00:13,430 --> 00:00:17,060
inadvertently send microorganisms from Earth
along on the journey.

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00:00:17,060 --> 00:00:21,550
Schuerger: Many spacecraft are assembled and
launched from the Kennedy Space Center that

5
00:00:21,550 --> 00:00:22,000
are going

6
00:00:22,000 --> 00:00:27,380
to planetary bodies in the solar system, that
are bodies that life might be present on,

7
00:00:27,380 --> 00:00:28,460
or which we don't

8
00:00:28,460 --> 00:00:33,370
want to contaminate with terrestrial organism.
For example, Mars.

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00:00:33,370 --> 00:00:38,840
The Dust Atmospheric Recovery Technology,
or DART, is a innovation being developed by

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00:00:38,840 --> 00:00:39,620
Schuerger at

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00:00:39,620 --> 00:00:45,340
NASA's Kennedy Space Center in Florida.
It's designed to collect airborne dusts, bacteria

12
00:00:45,340 --> 00:00:46,250
and fungi in the

13
00:00:46,250 --> 00:00:48,890
atmosphere that can be returned to the lab
for analysis.

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00:00:48,890 --> 00:00:55,010
The results will make it easier to predict
levels of dust and microbial contamination

15
00:00:55,010 --> 00:00:55,780
on spacecraft

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00:00:55,780 --> 00:01:01,620
surfaces during payload processing and when
the spacecraft are on launch pads.

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00:01:01,620 --> 00:01:07,250
This knowledge also could help bolster Florida■s
agriculture industry against exotic, airborne

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00:01:07,250 --> 00:01:07,689
pathogens.

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00:01:07,689 --> 00:01:13,830
Schuerger: For example, if we find a very
large abundance of plant pathogens that come

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00:01:13,830 --> 00:01:15,060
into Florida

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00:01:15,060 --> 00:01:21,330
each year on the dust storms, then the state
and federal agriculture regulatory organizations

22
00:01:21,330 --> 00:01:22,420
may get

23
00:01:22,420 --> 00:01:27,490
involved in making recommendations to farmers,
to help mitigate problems that they might

24
00:01:27,490 --> 00:01:28,470
encounter

25
00:01:28,470 --> 00:01:31,330
from this influx of pathogens.

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00:01:31,330 --> 00:01:36,549
Some microbes are native to Florida, but others
arrive each year in the plumes of vast dust

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00:01:36,549 --> 00:01:37,200
storms that

28
00:01:37,200 --> 00:01:41,560
blow across the Atlantic Ocean from the western
shores of Africa.

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00:01:41,560 --> 00:01:46,920
As winds blow over the ground, all the microorganisms
at the surface and up to about 5,000 feet

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00:01:46,920 --> 00:01:47,170
above

31
00:01:47,170 --> 00:01:53,030
the ground get thoroughly mixed together.
Scientists needed a way to differentiate between

32
00:01:53,030 --> 00:01:53,280
what's

33
00:01:57,330 --> 00:02:02,150
Schuerger: But by placing this dust collection
system on an aircraft that can fly above that,

34
00:02:02,150 --> 00:02:02,490
we can

35
00:02:02,490 --> 00:02:09,490
separate the locally mixed turbulent air from
the dust that may be coming over from Africa.

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00:02:10,119 --> 00:02:15,810
The Florida Space Grant Consortium, Florida
Space Institute and the Emerging Pathogens

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00:02:15,810 --> 00:02:16,700
Institute at the

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00:02:16,700 --> 00:02:22,530
University of Florida in Gainesville all have
helped fund the project, and both NASA and

39
00:02:22,530 --> 00:02:22,819
the U.S.

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00:02:22,819 --> 00:02:26,720
Geological Survey have participated in the
research.

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00:02:26,720 --> 00:02:32,370
DART is designed to attach to any type of
aircraft or helicopter. The aircraft carries

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00:02:32,370 --> 00:02:33,810
DART into the air,

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00:02:33,810 --> 00:02:39,090
where the device will take air samples and
catch microbes in onboard filters. The system

44
00:02:39,090 --> 00:02:40,010
is controlled by

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00:02:40,010 --> 00:02:42,870
the scientist, who is in the cockpit during
flight.

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00:02:42,870 --> 00:02:49,590
Schuerger: This is actuating one of the doors
on the nose cone. It opens, and as soon as

47
00:02:49,590 --> 00:02:51,610
that door opens,

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00:02:51,610 --> 00:02:53,650
of course the pump is on, and then the pump.

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00:02:53,650 --> 00:02:59,000
For its first two test flights in 2013, DART
was mounted to the underside of a wing on

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00:02:59,209 --> 00:03:04,270
performance jet called the F-104 Starfighter,
based at Kennedy Space Center.

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00:03:04,270 --> 00:03:09,890
Schuerger: That was a high altitude, high
speed test. But a lot of our science is to

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00:03:09,890 --> 00:03:11,140
collect dust very low in

53
00:03:11,140 --> 00:03:17,480
the atmosphere, and we needed a slower, more
versatile aircraft for low altitude flying,

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00:03:17,480 --> 00:03:19,500
so we've also in

55
00:03:19,500 --> 00:03:26,500
2014 flown over a dozen hours on an aircraft

called the T-6 Texan.

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00:03:26,709 --> 00:03:32,010
DART passed its tests with flying colors.
Its mechanical system, including the controller

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00:03:32,010 --> 00:03:32,890
and pump,

58
00:03:32,890 --> 00:03:37,750
worked as expected, and the team collected
microorganisms at a variety of altitudes.

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00:03:37,750 --> 00:03:39,280
The filters then

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00:03:39,280 --> 00:03:42,140
were processed in the laboratory.

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00:03:42,140 --> 00:03:47,080
These successful operational flights have
helped establish a background of microorganisms

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00:03:47,080 --> 00:03:47,590
in Florida

63
00:03:47,590 --> 00:03:50,660
without the presence of African dust.

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00:03:50,660 --> 00:03:54,660
This sets the stage for upcoming flights into
the dust plumes later this year.

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00:03:54,660 --> 00:04:01,660
Schuerger: The next series of objectives for
DART will be to do systematic flights into

66
00:04:02,620 --> 00:04:03,650
the dust plumes

67
00:04:03,650 --> 00:04:09,239
that arrive in Florida from Africa between
mid-July and mid-September.

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00:04:09,239 --> 00:04:14,159
Schuerger plans to gather years worth of
data before, during and after the annual dust

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00:04:14,159 --> 00:04:15,129
storms in order

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00:04:15,129 --> 00:04:20,430
to create a database that will help NASA and
Florida agriculture better understand and