



# WHAT'S ON BOARD

SPACEX'S 22<sup>ND</sup> CARGO RESUPPLY

MISSION TO THE SPACE STATION

1  
00:00:13,130 --> 00:00:15,830  
THE PROJECT'S ALL ABOUT TRYING  
TO UNDERSTAND HOW THE EFFECTS

2  
00:00:15,830 --> 00:00:20,720  
OF MICROGRAVITY IS IMPACTING,  
HOW BENEFICIAL MICROBES AND

3  
00:00:20,720 --> 00:00:22,040  
ANIMALS TALK TO EACH OTHER.

4  
00:00:22,130 --> 00:00:27,009  
WE'RE SENDING THESE TINY SQUID  
INTO SPACE TO UNDERSTAND HOW THE

5  
00:00:27,009 --> 00:00:31,270  
BACTERIA ARE ACTUALLY COLONIZING  
AND INITIATING A CONVERSATION

6  
00:00:31,270 --> 00:00:32,470  
AT THE MOLECULAR LEVEL.

7  
00:00:32,619 --> 00:00:35,070  
WHEN THEY'RE BORN, THEY'RE  
BORN WITHOUT BACTERIA.

8  
00:00:35,460 --> 00:00:39,670  
AND SO WHEN THEY FLEW BEFORE WE  
LEARNED THAT EVEN IN MICROGRAVITY,

9  
00:00:40,060 --> 00:00:44,200  
YOU CAN HAVE YOUR PROPER SYMBIOTES,  
YOUR BENEFICIAL MICROBES FIND

10  
00:00:44,200 --> 00:00:45,040  
WHERE THEY'RE SUPPOSED TO GO.

11  
00:00:45,100 --> 00:00:49,060  
WE'RE GOING AGAIN, AND LOOKING

AT A LITTLE BIT MORE DEEPER

12

00:00:49,060 --> 00:00:52,330  
QUESTIONS ABOUT THE ACTUAL  
PROCESSES, THE FUNDAMENTAL

13

00:00:52,330 --> 00:00:55,990  
PROCESSES OF HOW THE BACTERIA  
ARE STARTING A CONVERSATION

14

00:00:55,990 --> 00:00:56,880  
WITH THE ANIMAL TISSUES.

15

00:00:56,880 --> 00:01:00,880  
SO WE'RE BUILDING ON THOSE PREVIOUS  
EXPERIMENTS FROM 10 YEARS AGO.

16

00:01:01,950 --> 00:01:06,870  
THE RAMSAT IS A CUBESAT SENT  
UP BY ROBERTSVILLE MIDDLE

17

00:01:06,870 --> 00:01:09,045  
SCHOOL IN OAK RIDGE, TENNESSEE.

18

00:01:09,195 --> 00:01:11,985  
THIS WILL BE ONE OF THE FIRST  
SATELLITES EVER TO BE SENT

19

00:01:11,985 --> 00:01:13,725  
UP BY A PUBLIC MIDDLE SCHOOL.

20

00:01:14,884 --> 00:01:18,365  
SO THE MISSION OF OUR SATELLITE  
IS THAT WE'RE LOOKING AT

21

00:01:18,365 --> 00:01:23,315  
THE REGROWTH OF WILDFIRES  
IN GATLINBURG IN CALIFORNIA.

22

00:01:23,494 --> 00:01:27,965  
SO WE CREATED THIS SATELLITE,  
UH, WITH SCIENTISTS

23  
00:01:27,994 --> 00:01:29,435  
FROM OUR NATIONAL LAB.

24  
00:01:30,035 --> 00:01:35,104  
IN THIS CLIP YOU CAN SEE WE'RE  
PUTTING THE SOLAR PANELS ON AND

25  
00:01:35,640 --> 00:01:38,700  
THIS SPECIFICALLY IS WHERE WE'RE  
SOLDERING THE WIRES TOGETHER.

26  
00:01:39,060 --> 00:01:43,910  
SO ALONG WITH OUR MISSION  
OF TRACKING THE FOREST FIRE

27  
00:01:43,910 --> 00:01:48,800  
REGROWN, WE ALSO HOPE TO BUILD  
CURRICULUM FOR OTHER MIDDLE

28  
00:01:48,800 --> 00:01:53,360  
SCHOOLS AND SCHOOLS AROUND THE  
GLOBE TO CREATE SATELLITES AND

29  
00:01:53,360 --> 00:01:57,200  
BECOME MORE INVESTED IN SPACE  
LIKE ALL OF OUR STUDENTS ARE.

30  
00:01:59,190 --> 00:02:03,960  
OUR PROJECT IS LOOKING AT HOW THESE  
TINY LITTLE MICROSCOPIC ANIMALS

31  
00:02:04,350 --> 00:02:08,970  
CALLED WATER BEARS OR TARDIGRADES  
ARE ABLE TO COPE WITH THE STRESSES

32  
00:02:09,030 --> 00:02:10,859

OF LONG-TERM SPACE FLIGHT.

33

00:02:11,400 --> 00:02:14,490  
AND WE'RE USING THESE ANIMALS  
BECAUSE THEY'RE SOME OF THE

34

00:02:14,519 --> 00:02:16,480  
TOUGHEST ANIMALS THAT WE KNOW OF.

35

00:02:16,800 --> 00:02:20,760  
THEY CAN SURVIVE BEING DRIED  
OUT, FROZEN, HEATED UP PAST

36

00:02:20,760 --> 00:02:21,930  
THE BOILING POINT OF WATER.

37

00:02:22,590 --> 00:02:26,780  
THEY CAN SURVIVE THOUSANDS OF TIMES  
AS MUCH RADIATION AS YOU OR I CAN.

38

00:02:26,810 --> 00:02:31,340  
AND THEY CAN SURVIVE SPACE  
FLIGHT AND EVEN EXPOSURE TO

39

00:02:31,340 --> 00:02:32,600  
THE VACUUM OF OUTER SPACE.

40

00:02:32,720 --> 00:02:35,960  
THE SORT OF TWO MAIN  
STRESSORS, UM, DURING SPACE

41

00:02:35,960 --> 00:02:39,590  
FLIGHT ARE MICROGRAVITY  
AND INCREASED RADIATION.

42

00:02:40,100 --> 00:02:45,710  
SO WE'LL BE LOOKING TO SEE WHAT  
GENES, WHAT PARTS OF THE ANIMALS,

43

00:02:45,730 --> 00:02:47,750

DNA THEY'RE TURNING ON AND OFF.

44

00:02:47,930 --> 00:02:51,830

AND SO BY UNDERSTANDING HOW THESE  
REALLY TOUGH LITTLE TARDIGRADES

45

00:02:51,830 --> 00:02:55,790

ARE ABLE TO SURVIVE IN THOSE  
CONDITIONS, WE'RE HOPING TO BE