
NORTHROP GRUMMAN
CRS-11 MISSION TO
THE SPACE STATION
WHAT'S
ON BOARD?
ANTARES

1
00:00:00,300 --> 00:00:15,315
[MUSIC]

2
00:00:16,750 --> 00:00:17,751
>> THESE WILL BE--

3
00:00:17,751 --> 00:00:19,319
SOON FLY AROUND, UH, IN

4
00:00:19,319 --> 00:00:21,020
THE U.S., UH, ORBITAL SEGMENT

5
00:00:21,020 --> 00:00:22,655
OF THE SPACE STATION,

6
00:00:22,655 --> 00:00:24,591
HELPING ASTRONAUTS OUT, UH,

7
00:00:24,591 --> 00:00:25,725
DOING SOME ROUTINE CHORES

8
00:00:25,725 --> 00:00:27,727
FOR THEM, AND ALSO, UH,

9
00:00:27,727 --> 00:00:28,895
DOING MORE, UH, RESEARCH

10
00:00:28,895 --> 00:00:30,530
AND SCIENCE, UH, AS

11
00:00:30,530 --> 00:00:32,932
A MICROGRAVITY TESTBED, UH,

12
00:00:32,932 --> 00:00:34,667
REPLACING THE SPHERES,

13
00:00:34,667 --> 00:00:36,002

UH, TESTBED.

14
00:00:36,002 --> 00:00:36,970
PART OF WHAT WE WANNA DO

15
00:00:36,970 --> 00:00:38,605
ON ORBIT IS UNDERSTAND BETTER

16
00:00:38,605 --> 00:00:40,373
HOW ASTRONAUTS AND ROBOTS

17
00:00:40,373 --> 00:00:41,408
CAN INTERACT.

18
00:00:41,408 --> 00:00:43,009
BUT IT ALSO CAN BE USED, UM,

19
00:00:43,009 --> 00:00:45,445
AS A TOOL BY GROUND CONTROLLERS.

20
00:00:45,445 --> 00:00:47,180
SO WE CAN USE THE CAMERA

21
00:00:47,180 --> 00:00:49,416
TO, UH, TO DO VIDEO SURVEYS

22
00:00:49,416 --> 00:00:51,684
OR TO OBSERVE CREW ACTIVITIES,

23
00:00:51,684 --> 00:00:53,286
UM, SO THAT THE GROUND CAN BE

24
00:00:53,286 --> 00:00:54,554
ACTUALLY READY TO ANSWER

25
00:00:54,554 --> 00:00:55,889
ANY QUESTION THE CREW MIGHT HAVE

26
00:00:55,889 --> 00:00:57,657
IN A COMPLEX ACTIVITY.

27
00:00:57,657 --> 00:00:59,259
FOR FUTURE MISSIONS, ABSOLUTELY,

28
00:00:59,259 --> 00:01:00,593
UH, THOSE SORTS OF TASKS

29
00:01:00,593 --> 00:01:02,729
CAN BE TAKEN OVER BY A ROBOT.

30
00:01:02,729 --> 00:01:03,530
UH, WE EXPECT TO HAVE

31
00:01:03,530 --> 00:01:04,931
THESE SORT OF, UM, UH,

32
00:01:04,931 --> 00:01:06,266
ROBOTIC HELPERS.

33
00:01:06,266 --> 00:01:07,667
SO WE WILL HAVE THREE

34
00:01:07,667 --> 00:01:09,536
IN ORBIT, UM, EVENTUALLY.

35
00:01:09,536 --> 00:01:11,638
SO TWO ARE LAUNCHING ON NG-11,

36
00:01:11,638 --> 00:01:12,939
AND THEN THE THIRD ONE

37
00:01:12,939 --> 00:01:14,107
WILL BE JOINING IT, UH,

38
00:01:14,107 --> 00:01:15,608

LATER THIS SUMMER.

39
00:01:15,608 --> 00:01:17,877
>> WE LIVE AN EXCITING TIME,

40
00:01:17,877 --> 00:01:20,847
WHERE THE LIFT CAPACITY

41
00:01:20,847 --> 00:01:24,517
TO LOW EARTH ORBIT BECOMES

42
00:01:24,517 --> 00:01:26,586
AMAZINGLY AFFORDABLE.

43
00:01:26,586 --> 00:01:27,720
THE INTERESTING FEATURE

44
00:01:27,720 --> 00:01:29,255
OF SPECIALTY OPTICAL FIBER

45
00:01:29,255 --> 00:01:31,758
FOR THE SPACE ECONOMY IS THAT

46
00:01:31,758 --> 00:01:35,328
OPTICAL FIBERS HAVE UNIQUE

47
00:01:35,328 --> 00:01:37,197
VALUE TO MASS RATIO.

48
00:01:37,197 --> 00:01:38,765
JUST TO GIVE YOU AN EXAMPLE,

49
00:01:38,765 --> 00:01:40,667
SPECIALTY FIBER PREFORM

50
00:01:40,667 --> 00:01:42,235
SHOULD BE ABLE TO PRODUCE

51
00:01:42,235 --> 00:01:43,636
MULTIPLE KILOMETERS--

52
00:01:43,636 --> 00:01:45,705
LET'S ASSUME 40 KILOMETERS

53
00:01:45,705 --> 00:01:48,908
OF, UM, OPTICAL FIBER.

54
00:01:48,908 --> 00:01:50,343
THAT BRINGS THE VALUE

55
00:01:50,343 --> 00:01:52,479
OF OPTICAL FIBER, UH,

56
00:01:52,479 --> 00:01:55,648
TO MILLIONS PER KILOGRAM,

57
00:01:55,648 --> 00:01:57,550
WHILE THE LIFT, UH, PRICE

58
00:01:57,550 --> 00:01:59,252
FOR OPTICAL FIBER IS IN

59
00:01:59,252 --> 00:02:01,521
TENS OF THOUSANDS OF DOLLARS.

60
00:02:01,521 --> 00:02:03,823
SO WE SEE, UH,

61
00:02:03,823 --> 00:02:05,091
INTERESTING OPPORTUNITY

62
00:02:05,091 --> 00:02:06,626
TO COMMERCIALLY UTILIZE

63
00:02:06,626 --> 00:02:08,094

INTERNATIONAL SPACE STATION

64
00:02:08,094 --> 00:02:10,864
FOR SUSTAINABLE MANUFACTURING.

65
00:02:10,864 --> 00:02:11,798
>> THE VIRGINIA SPACE THINSAT

66
00:02:11,798 --> 00:02:13,199
PROGRAM IS AT ITS HEART

67
00:02:13,199 --> 00:02:14,634
A STEM OUTREACH PROGRAM.

68
00:02:14,634 --> 00:02:15,635
SO WE ARE CURRENTLY ACTIVE

69
00:02:15,635 --> 00:02:17,504
IN OVER 11 STATES, WITH

70
00:02:17,504 --> 00:02:18,905
OVER 50 SCHOOLS.

71
00:02:18,905 --> 00:02:20,974
WE'RE LAUNCHIN' 63 SATELLITES.

72
00:02:20,974 --> 00:02:21,774
SO WE'RE ACTUALLY ON

73
00:02:21,774 --> 00:02:23,309
THE AVIONICS RING,

74
00:02:23,309 --> 00:02:24,077
WHICH IS THE PART THAT'S

75
00:02:24,077 --> 00:02:25,445
JUST UNDERNEATH CYGNUS.

76
00:02:25,445 --> 00:02:26,379
SO WE ARE WHAT'S CONSIDERED

77
00:02:26,379 --> 00:02:27,914
A SECONDARY PAYLOAD.

78
00:02:27,914 --> 00:02:28,681
THE CYGNUS GOES TO

79
00:02:28,681 --> 00:02:30,149
THE SPACE STATION-- WE DO NOT.

80
00:02:30,149 --> 00:02:31,284
WE DEPLOY JUST BELOW

81
00:02:31,284 --> 00:02:32,652
THE SPACE STATION.

82
00:02:32,652 --> 00:02:34,654
WHAT BOB HAS HERE IS THE, UH,

83
00:02:34,654 --> 00:02:35,655
IS-IS THE THINSAT.

84
00:02:35,655 --> 00:02:36,556
SO THIS IS WHAT THE STUDENTS

85
00:02:36,556 --> 00:02:37,323
ARE-ARE WORKING ON

86
00:02:37,323 --> 00:02:37,991
AND BUILDING.

87
00:02:37,991 --> 00:02:38,958
SO THE STUDENTS CAN DESIGN

88
00:02:38,958 --> 00:02:40,460

WHATEVER CAN FIT IN THAT SPACE.

89
00:02:40,460 --> 00:02:41,761
>> THINK OF WHAT THAT'S GONNA DO

90
00:02:41,761 --> 00:02:43,696
FOR THE SPACE INDUSTRY.

91
00:02:43,696 --> 00:02:44,797
IF YOU CAN START A KID

92
00:02:44,797 --> 00:02:46,699
WITH HIS OWN SATELLITE

93
00:02:46,699 --> 00:02:48,468
THAT HAD A SENSOR IN IT

94
00:02:48,468 --> 00:02:50,036
UP IN SPACE WHEN HE'S IN

95
00:02:50,036 --> 00:02:51,571
ELEMENTARY SCHOOL,

96
00:02:51,571 --> 00:02:52,906
AND HE DOES IT IN JUNIOR HIGH,

97
00:02:52,906 --> 00:02:54,040
AND HE DOES IT AT HIGH SCHOOL,

98
00:02:54,040 --> 00:02:56,175
AND HE DOES IT IN UNIVERSITY,

99
00:02:56,175 --> 00:02:57,210
BOY, YOU'RE GONNA HAVE

100
00:02:57,210 --> 00:02:58,945
SOME GOOD PRODUCTS OUT OF IT.

101
00:02:58,945 --> 00:03:00,346
SO DOING SOMETHING LIKE THIS

102
00:03:00,346 --> 00:03:01,781
AT A-- AT A COST THAT

103
00:03:01,781 --> 00:03:03,550
YOU COULD GET DOWN INTO

104
00:03:03,550 --> 00:03:05,151
THE-THE ELEMENTARY SCHOOLS--

105
00:03:05,151 --> 00:03:07,387
AND WE DO HAVE THINSAT PROJECTS

106
00:03:07,387 --> 00:03:09,155
IN THE ELEMENTARY SCHOOLS.

107
00:03:09,155 --> 00:03:11,457
I THINK IT'S REALLY GREAT.

108
00:03:11,457 --> 00:03:12,926
>> SO THIS PROJECT IS ACTUALLY

109
00:03:12,926 --> 00:03:14,794
SEVEN YEARS IN DEVELOPMENT.

110
00:03:14,794 --> 00:03:16,029
NINA AND I HAVE BOTH SPENT

111
00:03:16,029 --> 00:03:17,130
BASICALLY ALL OF OUR ADULT

112
00:03:17,130 --> 00:03:18,431
SCIENCE CAREERS PREPARING

113
00:03:18,431 --> 00:03:19,265

FOR THIS.

114
00:03:19,265 --> 00:03:20,199
WHAT ANTIBODIES ARE ARE

115
00:03:20,199 --> 00:03:21,801
THEY'RE PROTEINS PRODUCED BY

116
00:03:21,801 --> 00:03:23,136
B CELLS, AND THEY'RE A TYPE

117
00:03:23,136 --> 00:03:24,537
OF WHITE BLOOD CELL.

118
00:03:24,537 --> 00:03:25,438
AND IT'S IMPORTANT FOR

119
00:03:25,438 --> 00:03:26,673
FIGHTING INFECTION.

120
00:03:26,673 --> 00:03:27,974
AND THE ANTIBODY REPERTOIRE

121
00:03:27,974 --> 00:03:29,542
IS THEN THAT COLLECTION

122
00:03:29,542 --> 00:03:31,578
OF ANTIBODIES THAT YOU HAVE.

123
00:03:31,578 --> 00:03:32,845
SO OUR PROJECT IS LOOKING

124
00:03:32,845 --> 00:03:35,181
SPECIFICALLY AT THE ANTI-TETANUS

125
00:03:35,181 --> 00:03:36,783
TOXOID REPERTOIRE.

126
00:03:36,783 --> 00:03:38,718
OBVIOUSLY, OUR IDEAL RESPONSE

127
00:03:38,718 --> 00:03:40,787
HERE WOULD BE THAT OUR MICE

128
00:03:40,787 --> 00:03:41,854
WOULD NOT HAVE ANY DIFFERENCE

129
00:03:41,854 --> 00:03:43,389
BETWEEN OUR GROUND MICE

130
00:03:43,389 --> 00:03:44,791
AND OUR SPACE MICE.

131
00:03:44,791 --> 00:03:45,792
AND THIS WOULD BE ABLE TO

132
00:03:45,792 --> 00:03:47,627
TELL US THAT HOPEFULLY,

133
00:03:47,627 --> 00:03:48,528
OUR ASTRONAUTS WILL BE

134
00:03:48,528 --> 00:03:50,029
PROTECTED IN SPACE.

135
00:03:50,029 --> 00:03:51,064
BUT WHAT WE'RE REALLY

136
00:03:51,064 --> 00:03:52,732
EXPECTING TO SEE IS THAT

137
00:03:52,732 --> 00:03:53,967
THERE'S GONNA BE SOME FORM

138
00:03:53,967 --> 00:03:55,602

OF IMMUNE DYSREGULATION.

139
00:03:55,602 --> 00:03:56,636
>> MIKE AND I HAVE ACTUALLY

140
00:03:56,636 --> 00:03:58,271
BEEN WORKING DOWN AT

141
00:03:58,271 --> 00:04:00,473
KENNEDY SPACE CENTER IN FLORIDA

142
00:04:00,473 --> 00:04:02,508
FOR THE PAST FEW WEEKS, UH,

143
00:04:02,508 --> 00:04:03,543
VACCINATING OUR MICE

144
00:04:03,543 --> 00:04:04,777
HERE ON THE GROUND

145
00:04:04,777 --> 00:04:06,846
BEFORE WE SEND THEM TO SPACE.

146
00:04:06,846 --> 00:04:08,748
SO AFTER WE SEND THEM TO SPACE,

147
00:04:08,748 --> 00:04:10,617
THEY WILL ACCLIMATE

148
00:04:10,617 --> 00:04:12,218
TO THE NEW ENVIRONMENT, AND THEN

149
00:04:12,218 --> 00:04:13,720
WE'LL CHALLENGE THEM AGAIN

150
00:04:13,720 --> 00:04:16,122
WITH THE SAME VACCINE AGAIN.

151
00:04:16,122 --> 00:04:18,958
AFTER THAT, WE'LL ALLOW

152
00:04:18,958 --> 00:04:20,627
THE IMMUNE RESPONSE TO DEVELOP--

153
00:04:20,627 --> 00:04:22,595
'CAUSE IT TAKES SOME TIME--

154
00:04:22,595 --> 00:04:24,130
AND THEN THE ASTRONAUTS WILL

155
00:04:24,130 --> 00:04:25,365
COLLECT TISSUE SAMPLES

156
00:04:25,365 --> 00:04:27,133
FOR US AND SEND IT BACK DOWN

157
00:04:27,133 --> 00:04:28,301
TO EARTH SO WE CAN DO

158
00:04:28,301 --> 00:04:29,869
THE DATA ANALYSIS.

159
00:04:29,869 --> 00:04:31,371
BUT I THINK THE COOLEST PART

160
00:04:31,371 --> 00:04:33,673
OF THIS EXPERIMENT IS THAT

161
00:04:33,673 --> 00:04:34,741
WHILE THE ASTRONAUTS ARE

162
00:04:34,741 --> 00:04:36,242
UP IN SPACE DOING

163
00:04:36,242 --> 00:04:37,910

THESE EXPERIMENTS, WE'RE HERE

164
00:04:37,910 --> 00:04:39,112
DOWN ON THE GROUND, DOING

165
00:04:39,112 --> 00:04:40,279
THE EXACT SAME THINGS

166
00:04:40,279 --> 00:04:41,714
THAT THEY'RE DOING.

167
00:04:41,714 --> 00:04:42,815
AND, YEAH,

168
00:04:42,815 --> 00:04:43,616
THAT'S HOW WE GET SOME