



1

00:00:04,560 --> 00:00:08,180

WELCOME TO NASA HEADQUARTERS IN WASHINGTON
D.C.

2

00:00:08,180 --> 00:00:11,730

I AM DUANE BROWN WITH THE OFFICE OF KEY MEDICATIONS.

3

00:00:11,730 --> 00:00:15,910

ON JULY 4TH, WE CELEBRATE OUR NATION'S INDEPENDENCE.

4

00:00:15,910 --> 00:00:21,859

AND ALSO ON THAT DAY, NASA LOOKS TO ACCOMPLISH
YET ANOTHER HISTORIC ACHIEVEMENT IN OUR SOLAR

5

00:00:21,859 --> 00:00:23,500

SYSTEM AND BEYOND.

6

00:00:23,500 --> 00:00:30,640

TO SET THE STAGE, WHAT YOU WILL HEAR TODAY
PLEASE WELCOME TO THE PODIUM THE ACTING ASSOCIATE

7

00:00:30,640 --> 00:00:32,759

ADMINISTRATOR FOR NOT NASA SCIENCE MISSION
DIRECTOR --

8

00:00:32,759 --> 00:00:45,840

>> IT TRULY IS AN EXCITING TODAY TODAY.

9

00:00:45,840 --> 00:00:53,910

THE NASA SCIENCE MISSION DIRECTOR COMMISSION
IS TO INNOVATE, EXPLORE, DISCOVER AND INSPIRE.

10

00:00:53,910 --> 00:01:00,250

OVER 100 MISSIONS, IT IS REALLY EASY TO USE
THIS ENTIRE PORTFOLIO IN MANY WAYS TO ACCOMPLISH

11

00:01:00,250 --> 00:01:01,250

THIS.

12

00:01:01,250 --> 00:01:06,530

NOT ONLY FOR THE SCIENCE COMMUNITY BUT ALSO
FOR THE WORLD AND HUMANKIND.

13

00:01:06,530 --> 00:01:14,320

LAST JULY, WE SAW THE FIRST EVER UP CLOSE
IMAGES OF PLUTO.

14

00:01:14,320 --> 00:01:20,369

THIS JULY 4TH, WE WILL NOT ONLY CELEBRATE
THE NATION'S INDEPENDENCE DAY ñ BUT THE SCIENCE

15

00:01:20,369 --> 00:01:26,090

COMMUNITY WILL ALSO PREPARE TO BEGIN WRITING
NEW CHAPTERS IN THE SCIENCE BOOKS.

16

00:01:26,090 --> 00:01:31,100

ABOUT JUPITER AND PERHAPS ABOUT OURSELVES.

17

00:01:31,100 --> 00:01:33,799

IN FACT, NASA SCIENTISTS REALLY INTERCONNECTED.

18

00:01:33,799 --> 00:01:42,359

SO EARTH SCIENCE, -- ASTROPHYSICS AND OF COURSE
PLANETARY SCIENCE.

19

00:01:42,359 --> 00:01:48,259

WE ARE ALL PART OF DEVELOPING INFORMATION
NEEDED TO DEVELOP THIS MISSION.

20

00:01:48,259 --> 00:01:59,389

AND OF COURSE, WE WILL AS WE COMPLETE THIS
MISSION AND GO FORWARD ñ ACHIEVE AND LEARN

21

00:01:59,389 --> 00:02:05,049

MORE ABOUT OURSELVES AND ABOUT THE ENVIRONMENT.

22

00:02:05,049 --> 00:02:09,899

AS WE NEAR THE DOORSTEP OF JUPITER, NASA IS

ALSO PREPARING TO LAUNCH THIS SEPTEMBER A

23

00:02:09,899 --> 00:02:11,740

SPACECRAFT TO A LARGE ASTEROID.

24

00:02:11,740 --> 00:02:18,010

IN ADDITION TO UPCOMING LAUNCHES TO FURTHER
STUDY THE EARTH, THE SUN AND UNIVERSE AS WE

25

00:02:18,010 --> 00:02:20,510

HAVE NEVER DONE BEFORE.

26

00:02:20,510 --> 00:02:31,549

NASA'S SCIENCE IS THE GREATEST ENGINE OF THE
THE LIST YOU WILL HEAR MORE ABOUT THE ENGINES.

27

00:02:31,549 --> 00:02:38,549

AND LAST, IF YOU LOOK IN THE SKY AND WATCH
THE FIREWORKS ON JULY 4TH, THINK ABOUT NASA

28

00:02:38,549 --> 00:02:45,190

AS WE ARE ABOVE AND BEYOND OUR MISSIONS.

29

00:02:45,190 --> 00:02:54,590

[APPLAUSE]

>> ALL RIGHT, LET'S SEE BEFORE I INTRODUCE

30

00:02:54,590 --> 00:03:00,190

OUR PANELISTS, ALL THE INFORMATION YOU'LL
HEAR TODAY AND MUCH MUCH MORE IS AVAILABLE

31

00:03:00,190 --> 00:03:08,010

ON THE INTERNET AT www.NASA.gov/JUNO AND ALSO
MISSIONS YOU KNOW.

32

00:03:08,010 --> 00:03:16,019

SWR I AT EDU -- IF YOU GO TO THE WEBSITE AND
I WOULD ENCOURAGE EVERYONE, NOT JUST HERE

33

00:03:16,019 --> 00:03:17,510
BUT WATCHING THE PROGRAM.

34
00:03:17,510 --> 00:03:24,090
THERE IS INCREDIBLE VIDEO THAT REALLY GIVES
YOU THE DRAMA AND INTENSITY OF WHAT THIS INCREDIBLE

35
00:03:24,090 --> 00:03:25,670
TEAM IS GOING TO EXPERIENCE.

36
00:03:25,670 --> 00:03:29,760
SO I ENCOURAGE YOU TO LOOK AT THE VIDEO.

37
00:03:29,760 --> 00:03:32,420
SOCIAL MEDIA, THE EXCITEMENT IS BUILDING.

38
00:03:32,420 --> 00:03:33,569
JOIN THE CONVERSATION.

39
00:03:33,569 --> 00:03:39,620
FACEBOOK, TWITTER, YOUTUBE, A LOT OF FOLKS
ARE TALKING ABOUT THE COUNT DOWN TO JUPITER.

40
00:03:39,620 --> 00:03:41,989
AND SEND IN YOUR QUESTIONS.

41
00:03:41,989 --> 00:03:45,370
AT #AskNASA.

42
00:03:45,370 --> 00:03:49,290
YOU HEAR A LOT OF INFORMATION, WE WILL TRY
TO GET TOO MANY QUESTIONS BUT IF WE CANNOT

43
00:03:49,290 --> 00:03:53,220
GET TO THEM TODAY WE'LL HAVE A SCIENCE TEAM
THAT WILL ANSWER YOUR QUESTIONS AS SOON AS

44
00:03:53,220 --> 00:03:55,000
POSSIBLE.

45

00:03:55,000 --> 00:04:00,030

SO BEFORE WE GET STARTED LET ME INTRODUCE
YOU TO TODAY'S PRESENTERS.

46

00:04:00,030 --> 00:04:08,880

FIRST UP, DIANE BROWN .
JUNO MISSION PROGRAM EXECUTIVE, NASA HEADQUARTERS.

47

00:04:08,880 --> 00:04:19,280

SCOTT BOLTON, JUNO PRINCIPAL INVESTIGATOR,
SOUTHWEST RESEARCH INSTITUTE SAN ANTONIO.

48

00:04:19,280 --> 00:04:29,490

RICK NYBAKKEN, JUNO PROJECT MANAGER, JET PROPULSION
LABORATORY PASADENA, CALIFORNIA.

49

00:04:29,490 --> 00:04:37,570

HEIDI BECKER , RADIATION MONITORING INVESTIGATION
LEAD ALSO FROM JET PROPULSION LABORATORY .

50

00:04:37,570 --> 00:04:46,590

ALBERTO IS -- ALBERTO ADRIANI, JUNO CO-INVESTIGATOR,
INSTITUTO DI ASTROFISICA E PLANETOLOGIA SPAZIALI,

51

00:04:46,590 --> 00:04:48,180

ROME.

52

00:04:48,180 --> 00:04:54,949

AND ALSO I WANT TO RECOGNIZE TWO INDIVIDUALS
IN THE FRONT ROW WHO WILL BE ANTICIPATING

53

00:04:54,949 --> 00:04:59,449

IN THE QUESTION-AND-ANSWER PERIOD AND FIRST
A GENTLEMAN THAT DOES NOT REALLY NEED A LOT

54

00:04:59,449 --> 00:05:00,449

OF INTRODUCING.

55

00:05:00,449 --> 00:05:05,449

HE HAS DONE A LOT OF PRESS CONFERENCES AND
KEEPS THE OFFICE OF COMMUNICATIONS VERY BUSY.

56

00:05:05,449 --> 00:05:10,680

WITH THE INCREDIBLE PLANETARY MISSIONS JIM
GREEN, THE DIRECTOR OF PLANETARY SCIENCE DIVISION

57

00:05:10,680 --> 00:05:13,669

AT NASA HEADQUARTERS.

58

00:05:13,669 --> 00:05:21,240

AND ALSO JOINING US, IN -- CHIEF SCIENTIST
FOR THE ITALIAN SPACE AGENCY.

59

00:05:21,240 --> 00:05:26,020

AND WITH THAT, FROM ONE BRAND TO ANOTHER OVER
TO YOU DIANE.

60

00:05:26,020 --> 00:05:27,979

>> Diane: GOOD AFTERNOON.

61

00:05:27,979 --> 00:05:31,160

WE'RE SO EXCITED TO BE WITHIN TWO WEEKS OF
THEIR TURN TO JUPITER.

62

00:05:31,160 --> 00:05:35,470

OUR LARGEST AND MOST BALANCE FASCINATING PLANETS
IN THE SOLAR SYSTEM.

63

00:05:35,470 --> 00:05:41,420

WE HAVE BEEN TO JUPITER BEFORE AND JUNEAU
WILL BEGIN TO ANSWER THEM.

64

00:05:41,420 --> 00:05:46,150

OTHER MISSIONS TO JUPITER INCLUDED PIONEER
10 AND 11 WHICH LOU BLY THE PLANET EARLY IN

65

00:05:46,150 --> 00:05:47,880

THE 1970S.

66

00:05:47,880 --> 00:05:52,770

AND VOYAGER ONE AND TWO WHICH FLEW BY IN 1979.

67

00:05:52,770 --> 00:05:56,790

OTHER MISSIONS HAVE ALSO GONE BY JUPITER ON
THEIR WAY TO OTHERS DESTINATIONS BUT THE MOST

68

00:05:56,790 --> 00:05:59,660

RECENT MISSION THERE WAS GALILEO WHICH WAS
1995.

69

00:05:59,660 --> 00:06:03,639

THE DROP THE PROBE INTO THE JUPITER ATMOSPHERE.

70

00:06:03,639 --> 00:06:09,729

MOST OF WHAT WE KNOW TODAY ABOUT JUPITER'S
COMPLEX SYSTEM OF MOONS NUMBER RINGS AND MAGNETIC

71

00:06:09,729 --> 00:06:12,729

FIELD COME FROM THE GALILEO MISSION.

72

00:06:12,729 --> 00:06:21,270

THE SECOND OF THREE ñ AS JEFF MENTIONED,
YOU ALL REMEMBER NEW HORIZONS WHICH PROVIDED

73

00:06:21,270 --> 00:06:27,800

AMAZING IMAGES OF PLUTO LAST YEAR AND THEN
THIS SEPTEMBER, THEY WILL BE LAUNCHING TO

74

00:06:27,800 --> 00:06:31,450

RETURN SAMPLES FROM THE NEAR EARTH ASTEROID.

75

00:06:31,450 --> 00:06:37,949

GINO WAS SELECTED OUT OF THE SECOND NEW FRONTIERS
ANNOUNCEMENT OF OPPORTUNITY IN 2005.

76

00:06:37,949 --> 00:06:44,009

IT LAUNCHED IN 2011 AND IT COST \$1.1 BILLION.

77

00:06:44,009 --> 00:06:46,880

THE JUNEAU TEAM HAS REPRESENTATION FROM AROUND
THE WORLD.

78

00:06:46,880 --> 00:06:53,169

THE SCIENTIST SPACECRAFT MANAGEMENT TEAM ACROSS
CALIFORNIA, ALABAMA, TEXAS, COLORADO AND HERE

79

00:06:53,169 --> 00:06:54,500

IN DC.

80

00:06:54,500 --> 00:07:00,520

THE SCIENTIST COME FROM ACROSS THE COUNTRY
AND MANY OF THE STATES IN THE UNITED STATES.

81

00:07:00,520 --> 00:07:07,490

SCIENCE INSTRUMENTS WERE DEVELOPED IN MARYLAND,
TEXAS, IOWA, CALIFORNIA, DENMARK, ITALY, CONTRIBUTIONS

82

00:07:07,490 --> 00:07:09,720

FROM MANY OTHER PLACES.

83

00:07:09,720 --> 00:07:13,400

NASA HAS A LONG HISTORY OF SIGNIFICANT MILESTONES
ON THE FOURTH OF JULY.

84

00:07:13,400 --> 00:07:22,090

JUST A FEW IN 1997 THE MARS PATHFINDER LANDED
ON MARS ñ PROVIDING AMAZING IMAGES OF THE

85

00:07:22,090 --> 00:07:23,430

MARTIAN LANDSCAPE.

86

00:07:23,430 --> 00:07:30,110

IN 2006 THE IMPACT MISSION COLLIDED WITH THE
COMET TEMPLE ONE TWO AND MORE ABOUT WHAT COMMENTS

87

00:07:30,110 --> 00:07:31,110

ARE MADE OF.

88

00:07:31,110 --> 00:07:35,740

AND OF COURSE THIS YEAR WE HAVE ARE ON FOURTH
OF JULY FIREWORKS AS WE ARRIVE AT JUPITER

89

00:07:35,740 --> 00:07:38,360

AND WE HOPE YOU ALL COME ALONG FOR THE RIDE.

90

00:07:38,360 --> 00:07:41,550

AND WITH THAT I HAD TALKED TO SCOTT TO TELL
US MORE ABOUT THE MISSION.

91

00:07:41,550 --> 00:07:43,630

>> Scott: THANK YOU DIANE.

92

00:07:43,630 --> 00:07:48,139

I'M REALLY EXCITED TO BE HERE, JUST A COUPLE
OF WEEKS FROM ARRIVING AT JUPITER.

93

00:07:48,139 --> 00:07:54,800

IT HAS BEEN SUCH A GREAT JOURNEY AND I CANNOT
WAIT TO GET THERE.

94

00:07:54,800 --> 00:08:01,830

SO ONE OF THE PRIMARY GOALS OF JUNEAU IS TO
LEARN THE RECIPE FOR SOLAR SYSTEMS.

95

00:08:01,830 --> 00:08:03,729

HOW DO YOU MAKE THE SOLAR SYSTEM?

96

00:08:03,729 --> 00:08:06,009

HOW DO MAKE THE PLANETS IN THE SOLAR SYSTEM?

97

00:08:06,009 --> 00:08:11,069

AND NOT JUST OUR SOLAR SYSTEM BUT HAD YOU
MAKE THE PLANETS THAT WE DISCOVER IN OTHER

98

00:08:11,069 --> 00:08:12,069

SOLAR SYSTEMS?

99

00:08:12,069 --> 00:08:16,400

WE'RE SEEING PLANETS AROUND OTHER STARS NOW
AND WHAT WE REALLY WANT NOW IS THE RECIPE.

100

00:08:16,400 --> 00:08:19,039

HOW DO YOU MAKE THESE PLANETS?

101

00:08:19,039 --> 00:08:24,970

NOW JUPITER HOLDS A VERY UNIQUE POSITION IN
HELPING US LEARN ABOUT THAT RECIPE.

102

00:08:24,970 --> 00:08:27,550

BECAUSE IT WAS THE FIRST PLANET FORMED.

103

00:08:27,550 --> 00:08:31,030

SO HE GIVES YOU THAT VERY FIRST STEP IN THE
RECIPE.

104

00:08:31,030 --> 00:08:36,810

WHAT HAPPENED AFTER THE SUN FORMED AND ALLOWED
THE PLANET TO FORM?

105

00:08:36,810 --> 00:08:43,860

BECAUSE THAT IS REALLY THE HISTORY OF NOT
ONLY OUR SYSTEM, BUT US HERE IN EARTH.

106

00:08:43,860 --> 00:08:48,370

AND WE DO NOT CURRENTLY UNDERSTAND HOW WE
FORMED JUPITER, WE'RE PUZZLED.

107

00:08:48,370 --> 00:08:54,529

WE LEARNED SOME THINGS FROM PREVIOUS MISSIONS
BUT JUPITER LOOKS A LOT LIKE THE SUN.

108

00:08:54,529 --> 00:08:59,220

A SMALLER VERSION, IT IS ALMOST ALL HYDROGEN
AND HELIUM JUST LIKE THE SUN IS.

109
00:08:59,220 --> 00:09:02,940
IN FACT THE WHOLE UNIVERSE IS ALMOST HYDROGEN
AND HELIUM.

110
00:09:02,940 --> 00:09:08,550
BUT WHEN WE LOOK CLOSELY AT THE COMPOSITION
OF JUPITER, WE LEARN THAT IT HAS AN ENRICHMENT

111
00:09:08,550 --> 00:09:11,800
OF WHAT SCIENTISTS CALL HEAVY ELEMENTS.

112
00:09:11,800 --> 00:09:15,910
ALL OF THE ELEMENTS BEYOND HELIUM AND MASS.

113
00:09:15,910 --> 00:09:19,990
SO CARBON, NITROGEN, SULFUR ñ NOBLE GASES.

114
00:09:19,990 --> 00:09:22,510
JUPITER IS AN RICH WITH THESE ELEMENTS.

115
00:09:22,510 --> 00:09:24,260
COMPARED TO THE SUN.

116
00:09:24,260 --> 00:09:27,450
WE DO NOT KNOW HOW EXACTLY HOW THAT HAPPENED.

117
00:09:27,450 --> 00:09:32,930
BUT WE KNOW IT IS REALLY IMPORTANT AND THE
REASON IT IS IMPORTANT IS THE STUFF THAT JUPITER

118
00:09:32,930 --> 00:09:36,550
HAS MORE OF, IS WHAT WE ARE ALL MADE OUT OF.

119
00:09:36,550 --> 00:09:42,770
IT IS WHAT THE EARTH IS MADE OUT OF, IT IS
WHAT LIFE COMES FROM.

120
00:09:42,770 --> 00:09:48,330

AND SO LEARNING ABOUT THAT HISTORY IS REALLY
CRITICAL IF WE ARE GOING TO FIGURE OUT HOW

121

00:09:48,330 --> 00:09:55,560

WE GOT HERE AND LEARN ABOUT THE EARTH AND
HOW WE FIND OTHER SYSTEMS LIKE THE EARTH ELSEWHERE.

122

00:09:55,560 --> 00:09:58,430

SO CAN I HAVE THE FIRST ANIMATION?

123

00:09:58,430 --> 00:10:04,170

SO HERE YOU SEE A SCIENTIST AND ARTIST CONCEPT
OF THE EARLY SOLAR SYSTEM.

124

00:10:04,170 --> 00:10:11,970

FIRST FOR ME, YOU HAVE THE YOUNG STAR, OUR
SON AND YOU HAVE CLOUDS OF GAS AND DUST SURROUNDING

125

00:10:11,970 --> 00:10:12,970

IT.

126

00:10:12,970 --> 00:10:13,970

THESE ARE LEFTOVERS.

127

00:10:13,970 --> 00:10:20,520

THE SUN FORMS FROM A CLOUD LIKE THAT, IT COLLAPSES
ON ITSELF AND THEN THERE IS LEFTOVERS.

128

00:10:20,520 --> 00:10:29,839

NOT MUCH, JUPITER SUCKS UP THE MAJORITY OF
THE SECOND ñ JUPITER SETS UP THE MAJORITY

129

00:10:29,839 --> 00:10:32,780

OF THE LEFT OVERS AFTER THE SUN IS FORMED.

130

00:10:32,780 --> 00:10:37,510

IF YOU TAKE ALL OF THE REST OF THE SOLAR SYSTEM,
ALL THE PLANETS, ASTEROIDS, COMETS, THEY ALL

131

00:10:37,510 --> 00:10:39,500
FIT INSIDE JUPITER.

132
00:10:39,500 --> 00:10:43,880
SO IT FORMS FIRST AND IT USES UP MOST OF THE
LEFTOVERS.

133
00:10:43,880 --> 00:10:48,420
WE ARE THE LEFTOVERS OF THE LEFTOVERS.

134
00:10:48,420 --> 00:10:54,139
SOMETHING HAPPENED BETWEEN THE TIME THE SUN
FORMED AND THE TIME JUPITER FORMED THAT ALLOWED

135
00:10:54,139 --> 00:10:56,670
IT TO BE ENRICHED IN THE HEAVY ELEMENTS.

136
00:10:56,670 --> 00:10:59,920
AND IT EVENTUALLY LEADS TO US.

137
00:10:59,920 --> 00:11:03,920
WE DO NOT KNOW WHAT HAPPENED THERE BUT IT
WAS VERY IMPORTANT BECAUSE THE BEGINNING OF

138
00:11:03,920 --> 00:11:10,070
THE PROCESS OF HOW YOU CREATE THE TERRESTRIAL
PLANETS AND LIFE ñ STARTED ALREADY EARLY

139
00:11:10,070 --> 00:11:12,690
IN THE SOLAR SYSTEM WHEN WE SAW JUPITER FORM.

140
00:11:12,690 --> 00:11:15,170
IT STARTED TO GET THIS ENRICHMENT.

141
00:11:15,170 --> 00:11:17,019
AND THE REST OF THE PLANETS GOT EVEN MORE.

142
00:11:17,019 --> 00:11:18,019
RIGHT?

143
00:11:18,019 --> 00:11:21,140
THE EARTH IS ALMOST ALL OF THESE HEAVY ELEMENTS.

144
00:11:21,140 --> 00:11:26,970
AND SO THE WEIGHT JUNO INVESTIGATE THIS IS
BY LOOKING AT THE INTERIOR OF JUPITER.

145
00:11:26,970 --> 00:11:30,740
SEEING HOW WAS IT BUILT, WHAT IS IT MADE OUT
OF?

146
00:11:30,740 --> 00:11:35,339
THESE ARE THE CLUES FOR US TO COMPARE TO THE
SUN AND UNDERSTAND THE PROCESSES THAT WENT

147
00:11:35,339 --> 00:11:36,540
ON IN THE EARLY SOLAR SYSTEM.

148
00:11:36,540 --> 00:11:39,459
CAN I HAVE MY NEXT VIDEO PLEASE?

149
00:11:39,459 --> 00:11:44,900
SO HERE YOU SEE JUPITER SPINNING AROUND AND
THESE BEAUTIFUL ZONES AND BELTS.

150
00:11:44,900 --> 00:11:46,779
WHAT IS UNDERNEATH THOSE?

151
00:11:46,779 --> 00:11:51,649
SO HAVE SPECIAL INSTRUMENTATION THAT LOOKS
DEEP IN AT THE MAGNETIC AND GRAVITY FIELD.

152
00:11:51,649 --> 00:11:54,579
SEE HOW IS IT SPINNING INSIDE, HOW IS IT STRUCTURED?

153
00:11:54,579 --> 00:11:57,779
IS THERE A COURT IN THE CENTER OF JUPITER?

154
00:11:57,779 --> 00:12:04,529
IF THERE IS A CORE OF HEAVY ELEMENTS, ROCKY
ICY MATERIALS SQUEEZED DOWN THE CENTER OF

155
00:12:04,529 --> 00:12:09,209
JUPITER, IT TELLS US SOMETHING ABOUT THE EARLY
PROCESSING IN THE SOLAR SYSTEM.

156
00:12:09,209 --> 00:12:16,620
THAT MEANS THAT ROCKS MUST HAVE FORMED IN
THE EARLY SOLAR SYSTEM BEFORE JUPITER DID.

157
00:12:16,620 --> 00:12:20,360
ESSENTIALLY, JUPITER GOT BUILT AROUND THOSE
ROCKS.

158
00:12:20,360 --> 00:12:23,090
WE DO NOT REALLY KNOW IF THERE IS A CORE IN
THE MIDDLE OF JUPITER.

159
00:12:23,090 --> 00:12:26,360
THAT IS ONE OF THE THINGS THAT JUNO WILL INVESTIGATE.

160
00:12:26,360 --> 00:12:33,120
IF THERE IS, THEN THAT MEANS IT TELLS YOU
SORT OF WHEN AND HOW AND A LITTLE BIT OF WHERE

161
00:12:33,120 --> 00:12:34,860
JUPITER MUST HAVE FORMED.

162
00:12:34,860 --> 00:12:41,000
THAT TIED WITH THE WATER ABUNDANCE ARE TWO
KEY DISCRIMINATORS ON THEORIES OF HOW AND

163
00:12:41,000 --> 00:12:45,010
WHERE JUPITER FORMED.

164
00:12:45,010 --> 00:12:49,310
THE OTHER INVESTIGATION THAT JUNEAU DOES IS

GO RIGHT OVER THE POLLS.

165
00:12:49,310 --> 00:12:52,519
AND IN ORDER TO DO ALL OF THIS WE ARE A POLAR
ORBIT.

166
00:12:52,519 --> 00:12:56,170
WHERE THE FIRST SPACECRAFT TO GO OVER THE
POLES OF JUPITER.

167
00:12:56,170 --> 00:13:01,600
WE GO VERY CLOSE AND AS WE FLY OVER THE POLLS
WE ARE FLYING RIGHT OVER JUPITER'S INTENSE

168
00:13:01,600 --> 00:13:05,029
OVER A PERIOD ITS NORTHERN AND SOUTHERN LIGHTS.

169
00:13:05,029 --> 00:13:07,339
CAN I HAVE THE NEXT VIDEO?

170
00:13:07,339 --> 00:13:13,480
THESE ARE THE STRONGEST AURORAL EMISSIONS
IN THE ENTIRE SOLAR SYSTEM.

171
00:13:13,480 --> 00:13:17,170
JUNO ñ JUPITER IS A PLANET ON STEROIDS.

172
00:13:17,170 --> 00:13:20,279
EVERYTHING ABOUT IT IS EXTREME.

173
00:13:20,279 --> 00:13:24,600
THOSE AURORA ARE INCREDIBLY POWERFUL COMPARED
TO EVEN THE EARTH'S.

174
00:13:24,600 --> 00:13:29,220
THESE LINES YOU SEE, THAT YOU SAW AROUND THERE
ARE MAGNETIC FIELD LINES.

175
00:13:29,220 --> 00:13:34,570

THE AURORA PARTICLES ARE COMING DOWN, JUNO
IS FLYING RIGHT OVER THOSE WITH INSTRUMENTS

176
00:13:34,570 --> 00:13:39,240
TO INVESTIGATE THOSE AURORA AND THE POLAR
MAGNETIC STRIPS FOR THE FIRST TIME AND COMPARE

177
00:13:39,240 --> 00:13:45,660
THE SCIENCE AND WHAT WE LEARN WITH HOW THE
AURORA ON SATURN AND THE EARTH.

178
00:13:45,660 --> 00:13:51,600
AND FROM THAT WE START TO LEARN OUR PLANETARY
ñ HOW AURORA WORK IN GENERAL.

179
00:13:51,600 --> 00:13:54,110
SO WHAT IS THE TOOL THAT WE USED TWO ON ALL
OF THIS?

180
00:13:54,110 --> 00:13:56,060
IT IS THE JUNO SPACECRAFT.

181
00:13:56,060 --> 00:13:57,920
CAN I GET THE NEXT ANIMATION?

182
00:13:57,920 --> 00:13:59,310
SO HERE YOU SEE JUNO.

183
00:13:59,310 --> 00:14:02,070
IT IS AN INCREDIBLY LARGE SPACECRAFT.

184
00:14:02,070 --> 00:14:03,370
IT IS SOLAR POWERED.

185
00:14:03,370 --> 00:14:08,089
EACH ONE OF THE SOLAR RAYS IS A -AND-A-HALF
METERS LONG A PIECE.

186
00:14:08,089 --> 00:14:10,070

OF 25 FEET.

187
00:14:10,070 --> 00:14:14,019
THIS SPACECRAFT IS THE SIZE OF A BASKETBALL COURT.

188
00:14:14,019 --> 00:14:15,509
IT IS ENORMOUS.

189
00:14:15,509 --> 00:14:21,360
THE SCIENTIFIC INSTRUMENTS ARE STATIONED IN BETWEEN THE SOLAR RAYS AIRED AS JUNO CARTWHEELS

190
00:14:21,360 --> 00:14:27,009
THROUGH SPACE, SPENDS TWICE A MINUTE, EACH OF THE SCIENCE INSTRUMENTS TAKES ITS TURN

191
00:14:27,009 --> 00:14:29,339
LOOKING AT JUPITER AS WE SPIN.

192
00:14:29,339 --> 00:14:35,600
THERE IS NOT A LOT OF FANCY ñ NEEDED WITH THIS SPACECRAFT.

193
00:14:35,600 --> 00:14:41,320
WE'RE SPINNING OVER JUPITER CAR WILLING AND ALL OF THE ESTIMATES LOOK DOWN AND UP TAKING

194
00:14:41,320 --> 00:14:44,269
A TURN LOOKING AT JUPITER AND THEN LOOKING AWAY TO CALIBRATE.

195
00:14:44,269 --> 00:14:51,160
IT IS A VERY EFFICIENT DESIGN, AND EVEN WITH THE GIANT SOLAR RAYS, JUPITER IS ABOUT FIVE

196
00:14:51,160 --> 00:14:54,110
TIMES THE DISTANCE FROM THE SUN THAT THE EARTH IS.

197
00:14:54,110 --> 00:15:00,649
SO THE SUNLIGHT IS ONLY 1/25 SO EVEN WITH
ENORMOUS SOLAR IS A VERY EFFICIENT WE'RE STILL

198
00:15:00,649 --> 00:15:02,209
ONLY GETTING A FEW HUNDRED WATTS.

199
00:15:02,209 --> 00:15:04,720
A COUPLE OF LIGHTBULBS.

200
00:15:04,720 --> 00:15:09,410
AND THE SPACECRAFT IS DESIGNED TO BE EXTREMELY
EFFICIENT.

201
00:15:09,410 --> 00:15:13,850
OKAY I WOULD LIKE TO TURN IT OVER TO RICK
NYBAKKEN , L PROJECT MANAGER AND HE WILL TELL

202
00:15:13,850 --> 00:15:19,649
YOU MORE ABOUT THE DEVELOPMENT OF JUNO AND
THE SCHEDULE OF EVENTS THAT ARE COMING OUT.

203
00:15:19,649 --> 00:15:20,649
>> Rick: THANK YOU SCOTT.

204
00:15:20,649 --> 00:15:28,449
SCOTT AND THE SCIENCE TEAM ASKED US TO TAKE
A SPACECRAFT WINDOW SPACECRAFT HAD GONE BEFORE.

205
00:15:28,449 --> 00:15:33,920
DEEP INTO THE HARSHTEST RADIATION ENVIRONMENT,
THE MOST TREACHEROUS ENVIRONMENT IN THE SOLAR

206
00:15:33,920 --> 00:15:36,180
SYSTEM.

207
00:15:36,180 --> 00:15:43,199
AND OPERATING FARTHER FROM THE SUN IN THAN
ANY OTHER MISSION IN HISTORY.

208
00:15:43,199 --> 00:15:47,500
SO LET ME TALK ABOUT SOME OF THE FEATURES
ON THE SPACECRAFT THAT ENABLE US TO MEET THOSE

209
00:15:47,500 --> 00:15:48,500
CHALLENGES.

210
00:15:48,500 --> 00:15:52,850
THE FIRST THING YOU NOTICE WHEN YOU LOOK AT
THE SPACECRAFT IS THE SIZE OF IT.

211
00:15:52,850 --> 00:15:56,639
AS SCOTT SAID IT IS ROUGHLY THE SIZE OF AN
NBA BASKETBALL COURT.

212
00:15:56,639 --> 00:16:06,649
BUT THESE MASSIVE RAYS CONTAIN 18,700 SOLAR
CELLS AND CAN GENERATE ALMOST 14,000 WATTS

213
00:16:06,649 --> 00:16:07,649
OF POWER.

214
00:16:07,649 --> 00:16:12,819
THAT IS MORE THAN A SPACECRAFT 'S DESIRE TO
HANDLE SO WHEN WE FLEW BY THE EARTH WE ACTUALLY

215
00:16:12,819 --> 00:16:15,880
TURNED OFF MOST OF THE SOLAR RAYS.

216
00:16:15,880 --> 00:16:24,200
WELL HAD TO, BUT AT JUPITER WITH SUNLIGHT
IS ONLY 1/25 OF WHAT YOU RECEIVE IT EARTH,

217
00:16:24,200 --> 00:16:27,720
THESE MASSIVE RAYS STILL GENERATE 530 WATTS
OF POWER.

218
00:16:27,720 --> 00:16:36,279

AS SCOTT SAID, THAT IS VERY POWER EFFICIENT
SPACECRAFT ONLY REQUIRING EQUIVALENT OF FIVE

219

00:16:36,279 --> 00:16:39,370
FLOOR LAMPS IN YOUR LIVING ROOM.

220

00:16:39,370 --> 00:16:44,769
TO MEET THE RADIATION CHALLENGE, CAN YOU QUEUE
THE VIDEO THERE?

221

00:16:44,769 --> 00:16:45,780
WE DESIGNED A VAULT.

222

00:16:45,780 --> 00:16:50,280
A RADIATION VAULT THAT PROTECTS A MOST IMPORTANT
ELECTRONIC.

223

00:16:50,280 --> 00:16:57,370
THEY ARE HOUSE AS YOU WALK IN HERE ALONG THE
SOLAR ARRAY YOU CAN SEE THAT SQUARE BOX UNDERNEATH

224

00:16:57,370 --> 00:16:58,779
THE ANTENNA.

225

00:16:58,779 --> 00:17:02,750
THAT IS THE RADIATION VAULT WHERE ALL OF THE
ELECTRONICS ARE HOUSED EXCEPT FOR THE INSTRUMENT

226

00:17:02,750 --> 00:17:03,750
CENTERS.

227

00:17:03,750 --> 00:17:06,100
WHICH AS SCOTT SAID, THEY ARE SPREAD AROUND
THE SPACECRAFT.

228

00:17:06,100 --> 00:17:12,390
SO LET'S TALK A LITTLE BIT ABOUT WHAT WE HAVE
BEEN DOING THE LAST FIVE YEARS.

229

00:17:12,390 --> 00:17:14,510
VIDEO PLEASE.

230
00:17:14,510 --> 00:17:19,440
WE LAUNCHED BACK IN AUGUST 2011 FROM CAPE
CANAVERAL AIR FORCE STATION.

231
00:17:19,440 --> 00:17:24,840
ON AN ATLAS 551 LAUNCH VEHICLE.

232
00:17:24,840 --> 00:17:31,960
THIS TOOK US OUT PAST MARS ORBIT WHERE WE
FIRED THE MAIN ENGINE TWICE BACK IN 2012.

233
00:17:31,960 --> 00:17:37,390
THIS INCREASED OUR SPEED AS WE WENT BACK AROUND
THE SUN AND FLEW BY THE EARTH RECEIVING THE

234
00:17:37,390 --> 00:17:38,840
GRAVITY ASSIST.

235
00:17:38,840 --> 00:17:45,070
THAT INCREASED OUR VELOCITY BY 70 PERCENT
OF WHAT WE GOT FROM THE VEHICLE IN 2011.

236
00:17:45,070 --> 00:17:51,640
THIS GAVE US THE ENERGY FINALLY TO REACH ALL
THE TO JUPITER AND ARRIVE THERE AND FIRE THE

237
00:17:51,640 --> 00:17:56,280
MAIN ENGINE TO GO INTO ORBIT AROUND JUPITER
ON JULY 4TH.

238
00:17:56,280 --> 00:17:59,380
MAY I HAVE THE SLIDE PLEASE?

239
00:17:59,380 --> 00:18:06,151
HERE IS WHAT'S AHEAD OF US IN TERMS OF CONFIGURING
THE SYSTEM AND DOING THE LAST THERE IS ACTIVITIES

240

00:18:06,151 --> 00:18:08,720

TO BE READY TO FIRE THE MAIN ENGINE.

241

00:18:08,720 --> 00:18:15,530

WE OPEN THE MAIN ENGINE COVER, PRESSURIZED
THE SYSTEM, GET SOME OTHER PREPARATION STEPS

242

00:18:15,530 --> 00:18:22,480

THERE BEFORE WE START THE JAIL I SEQUENCED
FIVE DAYS BEFORE THEY ARRIVE.

243

00:18:22,480 --> 00:18:26,540

THE LAST FOUR EVENTS ARE LESS FIVE EVENTS
THEY'RE ALL ON JULY 4TH ALL HAPPEN WITHIN

244

00:18:26,540 --> 00:18:33,790

HOURS OF THE MAIN ENGINE ñ SO WE START A
SPECIAL COMMUNICATION MODE THAT WE USE WHEN

245

00:18:33,790 --> 00:18:35,560

WE ARE IN BURN ORIENTATION.

246

00:18:35,560 --> 00:18:39,760

OUR NORMAL COMMUNICATION ARE NO LONGER POINTED
IT EARTH.

247

00:18:39,760 --> 00:18:46,210

AND SO EASY SPECIAL COMMUNICATIONS METHOD
TO SIGNIFY THE VARIOUS MILESTONES THROUGHOUT

248

00:18:46,210 --> 00:18:50,090

THE SEQUENCE LEADING UP TO THE BURN.

249

00:18:50,090 --> 00:18:53,550

THE ENGINE WILL BURN AND ALSO AFTER THE BURN.

250

00:18:53,550 --> 00:18:57,470

YOU PROBABLY NOTICE SOMETIMES LISTEN TO THE
CAR RADIO YOU'LL HEAR AN EMERGENCY BROADCAST

251

00:18:57,470 --> 00:18:58,470

SYSTEM TEST.

252

00:18:58,470 --> 00:19:00,120

THEY WILL SEND A TONE OUT.

253

00:19:00,120 --> 00:19:02,690

THAT IS WHAT THE SPACECRAFT DOES.

254

00:19:02,690 --> 00:19:06,130

IT SENDS A DIFFERENT FREQUENCY TONES TO MARK DIFFERENT EVENTS.

255

00:19:06,130 --> 00:19:11,840

THEN AS WE MOVE CLOSER TO THE BURN, WE MOVED TO TURN TO THE BURN ATTITUDE.

256

00:19:11,840 --> 00:19:17,230

WE ARE NOW ORIENTED 90 DEGREES AWAY FROM THE SUN WITH THE ENGINE POINTED JUST IN THE RIGHT

257

00:19:17,230 --> 00:19:23,900

DIRECTION TO STROKE SLOW US DOWN ENOUGH TO GET INTO JUPITER'S IMMENSE ORBIT.

258

00:19:23,900 --> 00:19:30,960

NEXT VIDEO PLEASE.

259

00:19:30,960 --> 00:19:33,370

CAN YOU QUEUE THE NEXT VIDEO?

260

00:19:33,370 --> 00:19:35,800

AND WE START OUR MAIN ENGINE BURN.

261

00:19:35,800 --> 00:19:39,260

THIS IS OUR THIRD MAIN ENGINE BURN.

262

00:19:39,260 --> 00:19:41,850

THE FOURTH ONE WILL COME UP 170 LATER.

263

00:19:41,850 --> 00:19:47,770

THE FIRST ONE HERE IS 35 MINUTES LONG, THE
FOURTH MAIN ENGINE BURN ON AUGUST 27 WILL

264

00:19:47,770 --> 00:19:52,470

BE 22 MINUTES LONG, THAT WILL GET US INTO
14 DAY SCIENCE ORBIT.

265

00:19:52,470 --> 00:19:56,420

SO IS REALLY A WELL-DESIGNED MISSION WHEN
YOU THINK ABOUT IT BECAUSE IF I FIRE THE MAIN

266

00:19:56,420 --> 00:20:02,870

ENGINE TWICE, WHICH REALLY GAVE US AN EXCELLENT
LEVEL OF PREPARATION FOR THIS, A VERY IMPORTANT

267

00:20:02,870 --> 00:20:06,260

EVENT FIRING THE MAIN ENGINE A THIRD TIME.

268

00:20:06,260 --> 00:20:11,130

WE KNOW HOW TO SET UP THE SYSTEM, WE KNOW
HOW THE ENGINE PERFORMS.

269

00:20:11,130 --> 00:20:16,470

THE ONLY THING NEW HERE IS HOW THE MAIN ENGINE
PERFORMS AND THE SPACECRAFT PERFORMS IN JUPITER'S

270

00:20:16,470 --> 00:20:17,600

ENVIRONMENT.

271

00:20:17,600 --> 00:20:23,810

HEIDI WILL TELL US A LITTLE BIT MORE ABOUT
THE INTENSE ñ.

272

00:20:23,810 --> 00:20:26,780

>> Heidi: THANK YOU RICK.

273
00:20:26,780 --> 00:20:31,800
JUPITER HAS THE SCARIEST RADIATION ENVIRONMENT
OF ANY PLANET IN THE SOLAR SYSTEM.

274
00:20:31,800 --> 00:20:39,170
IT IS THE HARSHTEST, THE MOST INTENSE AND IT
HAS NOT BEEN FULLY EXPLORED YET.

275
00:20:39,170 --> 00:20:42,620
AND IT HAS NOT BEEN FULLY EXPLORED WHERE WE
ARE GOING.

276
00:20:42,620 --> 00:20:47,160
JUPITER'S MAGNETIC FIELD HAS TRAPPED A HUGE
POPULATION OF ELECTRONS AND ACCELERATED THEM

277
00:20:47,160 --> 00:20:50,150
TO THE POINT WHERE THEY ARE MOVING AT ALMOST
THE SPEED OF LIGHT.

278
00:20:50,150 --> 00:20:55,290
THEY ARE INCREDIBLY PENETRATING, THEY ARE
DAMAGING TO ELECTRONICS AND THEY CAN CREATE

279
00:20:55,290 --> 00:20:59,410
ENOUGH NOISE IN THE DETECTOR TO TOTALLY BLIND
THE CAMERA.

280
00:20:59,410 --> 00:21:07,920
FIRST ANIMATION PLEASE JUPITER'S ELECTRONS
ARE MOVING SO FAST THEY SPIRAL UP AND DOWN

281
00:21:07,920 --> 00:21:12,140
AND BALANCE BETWEEN MAGNETIC POINTS A FEW
SECONDS.

282
00:21:12,140 --> 00:21:17,260
AND ONCE THE ELECTRONS HIT A SPACECRAFT, THEY
IMMEDIATELY BEGIN TO RICOCHET AND RELEASE

283

00:21:17,260 --> 00:21:21,920

ENERGY CREATING SECONDARY PHOTONS AND PARTICLES WHICH THEN RICOCHET.

284

00:21:21,920 --> 00:21:28,370

IT IS LIKE A SPRAY OF RADIATION.

285

00:21:28,370 --> 00:21:33,930

JUNO IS PROTECTED FROM THE RADIATION A LITTLE BIT BY OUR POLAR ORBIT.

286

00:21:33,930 --> 00:21:43,940

BUT, QUEUE THE NEXT ANIMATION ñ AS THE MISSION PROGRESSES, JUNO'S ORBIT WILL GO FURTHER AND

287

00:21:43,940 --> 00:21:48,490

FURTHER INTO THE EQUATORIAL REGION OF THE BELTS.

288

00:21:48,490 --> 00:21:57,390

AND EVERY SCIENCE ñ JUNO HAS TO FLY THROUGH CERTAIN REGIONS OF THE PLANET TWICE.

289

00:21:57,390 --> 00:22:04,960

IF WE DID NOTHING ELSE, JUNO WOULD BE EXPERIENCING A RADIATION DOSE OF OVER 20 MILLION WHICH

290

00:22:04,960 --> 00:22:12,880

IS LIKE A HUMAN UNDERGOING OVER 100 MILLION DENTAL X-RAYS IN LITTLE OVER A YEAR.

291

00:22:12,880 --> 00:22:20,140

SO JUNO IS WEARING A SUIT OF ARMOR.

292

00:22:20,140 --> 00:22:24,630

NEXT ANIMATION PLEASE ñ HERE AGAIN IS OUR RADIATION VAULT.

293

00:22:24,630 --> 00:22:31,100

IT IS MADE OF TITANIUM AND THE WALLS ARE ABOUT ONE HALF INCH THICK.

294

00:22:31,100 --> 00:22:33,059

THE VAULT WAYS ONLY 400 POUNDS EMPTY.

295

00:22:33,059 --> 00:22:38,430

AND IT IS ENOUGH TO BRING DOWN THE RADIATION DOSE BY A FACTOR OF 800.

296

00:22:38,430 --> 00:22:42,890

OUTSIDE THE VAULT, ALL OF THE INSTRUMENTS ARE ALSO WEARING BULLETPROOF VEST.

297

00:22:42,890 --> 00:22:54,250

AND THAT CAMERA AHEAD OF THE STAR TRACKER IS THE MOST HEAVILY SHIELDED ON JUNO.

298

00:22:54,250 --> 00:22:59,380

-- WITHOUT THE EXTRA PROTECTION, WE WOULD NOT BE ABLE TO NAVIGATE JUNO.

299

00:22:59,380 --> 00:23:04,350

A STAR TRACKER IS A LOT LIKE WHAT SAILORS USED TO DO ON SHIPS IN THE OLD DAYS.

300

00:23:04,350 --> 00:23:09,280

THEY WOULD LOOK INTO THE SKY AND LOOK AT THE PATTERNS OF THE STARS.

301

00:23:09,280 --> 00:23:12,640

TO UNDERSTAND WHERE THEY WERE POINTING TO NAVIGATE THE SEAS.

302

00:23:12,640 --> 00:23:17,660

AND A STAR TRACKER DOES PRETTY MUCH THE SAME THING, ONLY IT DOES IT BY TAKING PICTURES

303

00:23:17,660 --> 00:23:20,080

OF STARS.

304
00:23:20,080 --> 00:23:26,040
JUNO'S STAR TRACKER IS FOUR TIMES HEAVIER
THAN THE MOST HEAVY STANDARD STAR TRACKER.

305
00:23:26,040 --> 00:23:30,530
BECAUSE WITHOUT THE PROTECTION, THE NOISE
FROM THE PENETRATING RADIATION WOULD BE TOO

306
00:23:30,530 --> 00:23:32,090
HIGH TO SEE STARS.

307
00:23:32,090 --> 00:23:35,440
AND JUNO WOULD NEVER KNOW WHERE WAS POINTING.

308
00:23:35,440 --> 00:23:41,650
NEXT ANIMATION PLEASE ñ THIS IS AN ANIMATION
OF JUNO'S TRAJECTORY ON AUGUST 27.

309
00:23:41,650 --> 00:23:49,470
IT IS OUR CLOSEST APPROACH TO THE PLANET THAT
WILL BE 2600 MILES FROM THE CLOUD TOPS.

310
00:23:49,470 --> 00:23:54,600
AND THAT ORANGE AND YELLOW MAP IS OUR MODEL
OF THE RADIATION.

311
00:23:54,600 --> 00:23:56,750
WE GRAZE THROUGH IT TWICE.

312
00:23:56,750 --> 00:24:02,370
BUT THIS IS A REGION WHERE NO SPACECRAFT HAS
EVER BEEN.

313
00:24:02,370 --> 00:24:06,180
AND THIS IS JUST A MODEL.

314
00:24:06,180 --> 00:24:12,590
THERE IS NOT A DEDICATED DETECTOR ON JUNO

TO SENSE A HIGH-ENERGY ELECTRONS OF JUPITER.

315

00:24:12,590 --> 00:24:15,350

BUT WE HAVE A WAY TO WATCH.

316

00:24:15,350 --> 00:24:17,310

AND LEARN.

317

00:24:17,310 --> 00:24:24,600

NEXT ANIMATION PLEASE ñ WE WILL BE LOOKING
AT THE NOISE IN OUR CAMERAS AND COUNTING THE

318

00:24:24,600 --> 00:24:29,290

HITS OF THE RADIATION IT DOES GET INTO OUR
PICTURES.

319

00:24:29,290 --> 00:24:35,370

THIS IS A SIMULATION OF WHAT OUR RADIATION
MODELS PREDICT, OUR STAR IMAGES WILL LOOK

320

00:24:35,370 --> 00:24:42,170

LIKE AS WE FLY THROUGH THOSE VERY NASTY REGIONS
CLOSE TO THE PLANET.

321

00:24:42,170 --> 00:24:46,961

AND NOW TO TELL YOU A LITTLE BIT MORE ABOUT
ONE OF JUNO'S SCIENCE INSTRUMENTS I WILL HAND

322

00:24:46,961 --> 00:24:48,980

IT OVER TO ALBERTO ADRIANI.

323

00:24:48,980 --> 00:24:51,860

SPACE SIX THANK YOU.

324

00:24:51,860 --> 00:25:06,040

NOW WE SPEAK ABOUT ñ -- THE INSTRUMENT IS
A SMALL TELESCOPE AND TWO DETECTORS SO THAT

325

00:25:06,040 --> 00:25:08,290

IT IS PRACTICALLY A DOUBLE INSTRUMENT.

326

00:25:08,290 --> 00:25:14,030

IN THE CAMERA AND ñ AT THE SAME TIME.

327

00:25:14,030 --> 00:25:18,830

JUNO WILL OBSERVE THE PLANET AND INFRARED LIGHT.

328

00:25:18,830 --> 00:25:26,940

JUNO IS AN ITALIAN SPACE AGENCY INSTRUMENT, AND ITALY HAS A LONG HISTORY ABOUT BUILDING

329

00:25:26,940 --> 00:25:29,480

SIMILAR INSTRUMENTS FOR OTHER MISSIONS.

330

00:25:29,480 --> 00:25:43,790

HERE WE HAVE A COUPLE -- JUNO IS PRIMARILY CONCEIVED TO GIVE THE CONTRIBUTION

331

00:25:43,790 --> 00:25:57,170

OF THE MAGNETIC ñ THE MAGNETOSPHERE OF THE PLANET -- IN PARTICULAR, THE AURORA.

332

00:25:57,170 --> 00:26:00,480

CAN I HAVE THE FIRST PICTURE PLEASE?

333

00:26:00,480 --> 00:26:04,850

IN THIS PICTURE YOU CAN SEE TWO AURORAS.

334

00:26:04,850 --> 00:26:08,080

ON THE LEFT THERE IS AN ULTRAVIOLET AURORA.

335

00:26:08,080 --> 00:26:13,010

THAT HAS BEEN MEASURED FROM THE SPACE FROM THE HUBBLE SPACE TELESCOPE.

336

00:26:13,010 --> 00:26:20,210

ON THE RED RIGHT THERE IS AN INFRARED MEASURED

FROM GROUND IN THE INFRARED.

337

00:26:20,210 --> 00:26:23,960

FROM A SEVEN -- FROM AN OBSERVATORY.

338

00:26:23,960 --> 00:26:27,260

SO THERE ARE TWO AURORAS.

339

00:26:27,260 --> 00:26:40,110

WE HAVE TWO DIFFERENT MISSIONS FROM THE AURORA
BECAUSE CAUSES OF THIS ADMISSION LIGHT IS

340

00:26:40,110 --> 00:26:43,130

DIFFERENT.

341

00:26:43,130 --> 00:26:52,670

WHAT CAUSES THE EMISSION OF THE AURORA IS
THE ELECTRONIC ñ THE ELECTRONS.

342

00:26:52,670 --> 00:27:02,720

THEY INTERACT WITH HER HYDROGEN GETTING AN
ULTRAVIOLET AURORA.

343

00:27:02,720 --> 00:27:05,870

-- WE LOOK AT THE INFRARED AURORA.

344

00:27:05,870 --> 00:27:14,710

SO, IN THE PICTURE I SHOWED BEFORE, IT IS
ACTUALLY THE ONLY CASE FROM THE PREVIOUS MEASUREMENT

345

00:27:14,710 --> 00:27:23,240

WE HAVE ON THE JUPITER AURORA PERIOD IN WHICH
THE TWO PHENOMENON, MEASURE ñ FROM JUNO WE

346

00:27:23,240 --> 00:27:30,340

WILL HAVE MANY OCCASIONS TO HAVE SIMULTANEOUS
MEASUREMENTS OF THE TWO ASPECTS OF THE JUPITER

347

00:27:30,340 --> 00:27:32,250

AURORA.

348

00:27:32,250 --> 00:27:35,060

CAN I HAVE THE NEXT PICTURE?

349

00:27:35,060 --> 00:27:47,230

JUNO, WE WILL ALSO BE USED TO STUDY SOME OF THE JUPITER ATMOSPHERE.

350

00:27:47,230 --> 00:27:55,360

IN PARTICULAR, I'M JUPITER THERE ARE SOME ñ YOU SEE IN THIS ANIMATION THE BRIGHTEST

351

00:27:55,360 --> 00:27:57,730

SPOT HERE.

352

00:27:57,730 --> 00:28:03,490

WHERE THE ATMOSPHERE IS ALMOST CLEAN WITHOUT BIG CLOUDS.

353

00:28:03,490 --> 00:28:16,520

AND JUNO CAN LOOK DEEPER INSIDE THE ATMOSPHERE AND FROM THAT MEASURE SOME CONCENTRATION WITH

354

00:28:16,520 --> 00:28:23,600

SIGNIFICANT ROLE IN THE ATMOSPHERIC CHEMISTRY OF THE PLANET.

355

00:28:23,600 --> 00:28:26,330

CLOUD FORMATION.

356

00:28:26,330 --> 00:28:36,700

OTHER GOALS ARE STUDY OF THE JUPITER CLOUDS AND TO SOME EXTENT DYNAMICS OF THE ATMOSPHERE.

357

00:28:36,700 --> 00:28:52,620

CAN I HAVE THE NEXT ñ JUNO, IN THIS ANIMATION YOU SEE THE INSTRUMENT WHICH IS MOUNTED ON

358

00:28:52,620 --> 00:28:55,040
THE BACKSIDE OF THE SPACECRAFT.

359
00:28:55,040 --> 00:29:08,010
THIS WHICH IS THE SPACE WHICH IS ALWAYS LOOKING
-- YOU SEE THE SPINNING OF THE SPACECRAFT

360
00:29:08,010 --> 00:29:15,490
AND THIS YOU HAVE SEEN BEFORE THEY ARE THE
TWO LIGHT THAT YOU SEE, IN THE INSTRUMENT.

361
00:29:15,490 --> 00:29:23,870
IT IS ACTUALLY THE BACK OF THE LIGHT COMING
FROM THE SPACE FROM THE PLANET REACHING ñ

362
00:29:23,870 --> 00:29:30,750
JUNO WILL COMPENSATE THE MOVEMENT OF THE SPINNING
SPACECRAFT.

363
00:29:30,750 --> 00:29:37,910
IN THIS CASE, THIS IS NEEDED BECAUSE DURING
THE OBSERVATION THE IMAGE OR THE TARGET WE'RE

364
00:29:37,910 --> 00:29:41,070
GOING HAS TO BE STILL.

365
00:29:41,070 --> 00:29:48,690
THE NEXT MOVIE PLEASE ñ IN THIS MOVIE, I
SHOW A SIMULATION.

366
00:29:48,690 --> 00:29:57,950
[INDISCERNABLE] WHEN YOU CAN LOOK AT THE PLANET,
YOU SEE HERE THE MOVING PART IS THE TRACK

367
00:29:57,950 --> 00:30:00,420
OF THE DETECTORS OF THE INSTRUMENT.

368
00:30:00,420 --> 00:30:09,860
THIS IS TO ñ THEY TAKE THE AURORA MEASUREMENTS.

369
00:30:09,860 --> 00:30:22,280
FINALLY YOU CAN SEE HERE, THE MAIN DASH OF
THE JUPITER AURORA.

370
00:30:22,280 --> 00:30:29,450
THE TRACK OF THE SATELLITE TO THE CONTRIBUTION
TO THE AURORA.

371
00:30:29,450 --> 00:30:37,280
SO, WE'RE LOOKING FOR TO GET TO THE JUPITER
IN A COUPLE OF WEEKS AND WE ARE VERY EXCITED

372
00:30:37,280 --> 00:30:38,470
ABOUT IT.

373
00:30:38,470 --> 00:30:42,460
SO LET ME GIVE THE MICROPHONE TO SCOTT BOLTON.

374
00:30:42,460 --> 00:30:45,820
>> Scott: THANK YOU ALBERTO.

375
00:30:45,820 --> 00:30:49,990
SO THE JUNO TEAM IS REALLY EXCITED.

376
00:30:49,990 --> 00:30:55,270
ALL THE SCIENTISTS AND ENGINEERS THAT MAY
JUNO HAPPEN ARE SO EXCITED THAT WE'RE FINALLY

377
00:30:55,270 --> 00:31:02,360
ARRIVING AT JUPITER AND WE'RE GOING TO START
THIS INCREDIBLE JOURNEY OF LEARNING OUR HISTORY

378
00:31:02,360 --> 00:31:08,600
AND WHAT IS INSIDE JUPITER AND ALL ABOUT HOW
THE PHYSICS WORK AT JUPITER.

379
00:31:08,600 --> 00:31:13,100
AND WE WANT THE PUBLIC TO BE ABLE TO SHARE
IN THAT EXCITEMENT.

380
00:31:13,100 --> 00:31:17,050
WE WANT THEM TO JOIN AND JUMP ON AND RIDE
WITH US.

381
00:31:17,050 --> 00:31:19,870
INTO OUR JOURNEY OF EXPLORATION.

382
00:31:19,870 --> 00:31:26,480
AND SO I WILL TAKE ABOUT A COUPLE OF ITEMS
THAT WE HAVE WITH JUNO THAT HELP ENABLE THAT.

383
00:31:26,480 --> 00:31:32,080
ONE OF THEM IS OUR VISIBLE CAMERA, THE COLOR
CAMERA WE CALL IT JUNO CAM.

384
00:31:32,080 --> 00:31:37,530
IT WILL PROVIDE THE VERY FIRST VIEWS OF JUPITER'S
POLLS.

385
00:31:37,530 --> 00:31:39,560
WE DO NOT KNOW WHAT THEY LOOK LIKE.

386
00:31:39,560 --> 00:31:42,580
WE'LL FLY OVER THOSE AND SEE THEM FOR THE
VERY FIRST TIME.

387
00:31:42,580 --> 00:31:48,660
IT WILL ALSO SHOW THE MOST INCREDIBLE CLOSE-UP
VIEWS OF JUPITER EVER SEEN BECAUSE WE ARE

388
00:31:48,660 --> 00:31:51,580
COMING SO CLOSE TO JUPITER.

389
00:31:51,580 --> 00:31:57,600
THE PUBLIC TENT CAN JOIN US ON THAT CAMERA
BECAUSE IT IS REALLY A PUBLIC CAMERA.

390
00:31:57,600 --> 00:32:05,040

THAT CAMERA IS ON BOARD AND HAVE A WEBSITE
SET UP WHERE THE PUBLIC CAN SIGN ON AND HELP

391
00:32:05,040 --> 00:32:12,320
VOTE AND DECIDE WHERE JUNO CAM POINTS, WHAT
DO WE TAKE PICTURES OF, WHAT FEATURES ON JUPITER

392
00:32:12,320 --> 00:32:13,940
ARE THE MOST INTERESTING.

393
00:32:13,940 --> 00:32:19,250
THEY CAN ENGAGE IN A DEBATE OF WHICH THINGS
ARE MOST IMPORTANT TO PHOTOGRAPH.

394
00:32:19,250 --> 00:32:26,480
AND THEN WHEN THE DATA COMES DOWN, THEY CAN
PRODUCE THE FIRST IMAGES OF JUPITER AND POST

395
00:32:26,480 --> 00:32:28,410
THEM ON OUR WEBSITE.

396
00:32:28,410 --> 00:32:34,891
AND SO THIS CAMERA IS REALLY ALLOWING THE
PUBLIC TO JOIN IN AND BECOME PART OF THE JUNO

397
00:32:34,891 --> 00:32:36,450
TEAM.

398
00:32:36,450 --> 00:32:40,280
DOING SOME OF THE SCIENCE, CREATING SOME OF
THOSE IMAGES.

399
00:32:40,280 --> 00:32:43,230
AND SHARING THOSE WITH THE WORLD.

400
00:32:43,230 --> 00:32:49,320
AND WE HAVE ANOTHER ASPECT, I OFTEN GET ASKED
TO HAVE ANY PASSENGERS ON BOARD?

401

00:32:49,320 --> 00:32:53,450
WELL WE DO, WE HAVE THREE SPECIAL PASSENGERS.

402

00:32:53,450 --> 00:32:56,620
THERE ACTUALLY LEGO MANY FIGURES.

403

00:32:56,620 --> 00:33:01,780
THESE ARE MADE EITHER LEGO COMPANY AND A SPECIAL
AGREEMENT WITH NASA AND THEY ARE MADE OUT

404

00:33:01,780 --> 00:33:04,740
OF SPACECRAFT GRADE ALUMINUM.

405

00:33:04,740 --> 00:33:09,190
AND WE HAVE THREE OF THEM, THIS IS JUNO, THE
GODDESS.

406

00:33:09,190 --> 00:33:15,380
SHE HAS A SISTER AND WIFE OF JUPITER WHO IS
RIGHT HERE HOLDING HIS LIGHTNING BOLT.

407

00:33:15,380 --> 00:33:20,970
AND GALILEO, IN HONOR OF HIS GREAT DISCOVERIES
THAT ENABLED US TO LEARN SO MUCH ABOUT THE

408

00:33:20,970 --> 00:33:22,560
UNIVERSE AND NATURE.

409

00:33:22,560 --> 00:33:26,480
AND HE IS HOLDING JUPITER IN HIS TELESCOPE.

410

00:33:26,480 --> 00:33:34,140
AND WE PUT THESE LEGO MANY FIGURES ON JUNO
IN ORDER TO INSPIRE AND MOTIVATE AND ENGAGE

411

00:33:34,140 --> 00:33:40,760
CHILDREN TO HAVE THEM, HELP THEM SHARE IN
THE EXCITEMENT OF SPACE EXPLORATION.

412

00:33:40,760 --> 00:33:47,880

AND IN REACHING FOR THE BEST GOALS THAT YOU
CAN, REACH OUT ñ LITERALLY FOR THE STARS.

413

00:33:47,880 --> 00:33:52,160

WE WANT TO TEACH THEM THAT THEY CAN ACCOMPLISH
ANYTHING.

414

00:33:52,160 --> 00:33:55,060

AND WE ARE REACHING FOR THE STARS HERE, THEY
CAN JOIN US.

415

00:33:55,060 --> 00:33:57,100

OR THEY CAN REACH FOR THEIR OWN STARS.

416

00:33:57,100 --> 00:34:01,820

WE JUST WANT TO INSPIRE THEM AND GET THEM
EXCITED ABOUT THE WHOLE EXPLORATION PROGRAM

417

00:34:01,820 --> 00:34:04,890

AND LEARNING ABOUT NATURE.

418

00:34:04,890 --> 00:34:11,099

AND SO, JULY 4TH IS COMING UP AND WE ARE ABOUT
TO ARRIVE.

419

00:34:11,099 --> 00:34:17,000

AND I REALLY LOOK FORWARD TO THAT AND I HOPE
YOU'LL ALL JOIN US AS WE ARRIVE AT JUPITER

420

00:34:17,000 --> 00:34:21,280

AND JUMP ON THE JUPITER TRAIN.

421

00:34:21,280 --> 00:34:26,090

THANK YOU.

422

00:34:26,090 --> 00:34:30,900

>>.

[APPLAUSE]

423

00:34:30,900 --> 00:34:31,900

>> AND THANK YOU ALL.

424

00:34:31,900 --> 00:34:37,860

A REMINDER FOR THE FOLKS IN THE AUDITORIUM
HERE YOU MAY NOTICE THAT THERE IS A LEGO MADE

425

00:34:37,860 --> 00:34:39,700

SPACECRAFT OUT IN FRONT OF THE AUDITORIUM.

426

00:34:39,700 --> 00:34:44,870

AND YOU CAN ACTUALLY SEE WHERE THE LITTLE
GUYS ARE IF YOU LOOK VERY CLOSELY.

427

00:34:44,870 --> 00:34:49,700

AND FOR THE FOLKS WATCHING, WE'LL SEE IF WE
GET A PICTURE AND PUT IT OUT ON SOCIAL MEDIA

428

00:34:49,700 --> 00:34:51,100

SO YOU CAN SEE THAT.

429

00:34:51,100 --> 00:34:52,390

IT IS VERY VERY COOL.

430

00:34:52,390 --> 00:34:57,090

WE'RE GOING TO TAKE SOME QUESTIONS AND I THINK
THAT DIANE HAS ONE OF THE FIRST QUESTIONS

431

00:34:57,090 --> 00:35:01,290

WHERE THEY CAN GET THE COOL T-SHIRTS YOU GUYS
HAVE ON.

432

00:35:01,290 --> 00:35:02,890

VERY AWESOME SHIRTS.

433

00:35:02,890 --> 00:35:09,050

WE'RE GOING TO GO TO THE PHONE LINES 1ST AND
WE'LL HAVE MIKE FROM SPACE.COM.

434

00:35:09,050 --> 00:35:11,700

>> THANKS GUYS.

435

00:35:11,700 --> 00:35:18,310

THIS IS PROBABLY FOR SCOTT.

436

00:35:18,310 --> 00:35:34,730

SCOTT, YOU ARE TALKING ABOUT HOW JUPITER HAS
A CORE IF THEY HAVE A COURT WILL TELL YOU

437

00:35:34,730 --> 00:35:35,730

MORE ABOUT EVERYTHING.

438

00:35:35,730 --> 00:35:38,110

I WOULD JUST LIKE TO KNOW CAN YOU GO INTO
A LITTLE MORE DETAIL ABOUT WHAT YOU NEED AND

439

00:35:38,110 --> 00:35:39,110

WHAT YOU CAN POTENTIALLY LEARN FROM THE CORE
AND SORT OF WHY THAT WOULD TEACH YOU WHAT

440

00:35:39,110 --> 00:35:40,110

YOU WOULD HOPE TO LEARN?

441

00:35:40,110 --> 00:35:41,110

>> Scott: THANK YOU.

442

00:35:41,110 --> 00:35:43,770

SURE, SO JUPITER IS A GIANT BALL OF GAS.

443

00:35:43,770 --> 00:35:48,080

MOST OF ITS COMPOSITION IS JUST LIKE THE SUN,
IT IS ALMOST ALL HYDROGEN AND HELIUM.

444

00:35:48,080 --> 00:35:50,440

IS ENRICHED IN HEAVY ELEMENTS.

445

00:35:50,440 --> 00:35:53,670

WE DO NOT UNDERSTAND EXACTLY HOW THAT HAPPENED.

446

00:35:53,670 --> 00:35:58,380

WE ALSO DO NOT KNOW IF THERE IS A CORE IN
THE CENTER OF JUPITER, WE DON'T KNOW IF IT

447

00:35:58,380 --> 00:36:05,780

IS JUST GAS COMPRESSED ALL THE WAY DOWN BASICALLY
AND JUST THERE IS NO CORE OF ROCKY MATERIAL

448

00:36:05,780 --> 00:36:06,780

IN THE MIDDLE.

449

00:36:06,780 --> 00:36:08,420

OR IF THERE IS A CORE.

450

00:36:08,420 --> 00:36:13,140

SO, WE DO NOT KNOW THAT BECAUSE WE DON'T HAVE
VERY PRECISE DATA ON THE GRAVITY FIELD OF

451

00:36:13,140 --> 00:36:15,790

JUPITER UP UNTIL NOW.

452

00:36:15,790 --> 00:36:21,160

WE KNOW THAT SATURN HAS ONE OF THESE COURSE,
WE DO NOT KNOW ABOUT JUPITER.

453

00:36:21,160 --> 00:36:27,520

THE REAL QUESTION IS THAT IF JUPITER HAS A
CORE, OF ROCKY MATERIAL AND WE WILL BE ABLE

454

00:36:27,520 --> 00:36:33,150

TO LEARN SOMETHING ABOUT THAT BY STUDYING
THE DISTRIBUTION OF MASS INSIDE OF JUPITER

455

00:36:33,150 --> 00:36:35,600

THROUGH THE GRAVITY FIELD.

456

00:36:35,600 --> 00:36:42,590

THEN THAT CORE, MOST LIKELY WILL HAVE FORMED
IN THE EARLY SOLAR SYSTEM AND JUPITER KIND

457

00:36:42,590 --> 00:36:44,840

OF FORMS AROUND THAT CORE.

458

00:36:44,840 --> 00:36:51,890

BECAUSE ONCE YOU FORM JUPITER, YOU HAVE AN
INCREDIBLE GIANT ATMOSPHERE AND SO IF ROCKY

459

00:36:51,890 --> 00:36:58,800

MATERIAL OR LIKE AN ASTEROID WERE TO COME
IN AND HIT JUPITER NOW OR AFTER FORMS, THEY

460

00:36:58,800 --> 00:37:01,530

WILL EVAPORATE BASICALLY IN THE ATMOSPHERE.

461

00:37:01,530 --> 00:37:05,140

THEY WILL BURN UP AND WILL NOT EVER REACH
DOWN TO THE CORE.

462

00:37:05,140 --> 00:37:09,910

SO IF WE MEASURE IT TO SEE IF THERE IS A CONCENTRATION
OF HEAVY ELEMENTS OR CONCENTRATION OF MASS

463

00:37:09,910 --> 00:37:17,950

THAT IS SIGNIFICANT IN THE CENTER, THAT IMPLIES
THAT JUPITER FORMED AFTER ROCKS STARTED TO

464

00:37:17,950 --> 00:37:22,390

FORM AND ICE STARTED TO FORM IN THE EARLY
SOLAR SYSTEM.

465

00:37:22,390 --> 00:37:27,330

ALTERNATIVELY, JUPITER MAY HAVE FORMED LIKE
WE THINK THE SUN DID WHICH IS JUST A COLLAPSED

466

00:37:27,330 --> 00:37:29,080

OF THE GAS AND DUST.

467
00:37:29,080 --> 00:37:34,270
AND YOU DO NOT NEED ANY ROCKY MATERIAL IN
THE CENTER.

468
00:37:34,270 --> 00:37:41,940
>> NEXT QUESTION IS FROM BILL OF CBS NEWS.

469
00:37:47,630 --> 00:37:44,790
BILL?

470
00:37:47,630 --> 00:37:52,680
OKAY LET'S GO TO ALEX FROM NATURE.

471
00:37:52,680 --> 00:37:56,590
>> YES HI, MY QUESTION IS FOR SCOTT.

472
00:37:56,590 --> 00:38:02,590
YOU HAVE ALREADY BEEN TAKING PICTURES ALREADY
WENT WE GET TO SEE THOSE FIRST PICTURES FROM

473
00:38:02,590 --> 00:38:03,590
JUNO?

474
00:38:03,590 --> 00:38:10,400
>> SO WE HAVE BEEN TAKING SOME TEST PICTURES
OF JUPITER VERY SMALL BUT WE WILL RELEASE,

475
00:38:10,400 --> 00:38:15,670
IT HAS ALREADY BEEN A RELEASED SOME IMAGES
WE TOOK OF EARTH.

476
00:38:15,670 --> 00:38:23,770
BUT THE FIRST TIME WE RELEASED IMAGES OF JUPITER
WHEN YOU GET CLOSE IS ON JULY 4TH.

477
00:38:23,770 --> 00:38:32,329
>> OKAY WE'LL TAKE SOME QUESTIONS FROM SOCIAL
MEDIA BUT PLEASE IDENTIFY YOURSELF.

478
00:38:32,329 --> 00:38:37,100
>> WHAT IS ONCE THE SPACECRAFT ARRIVES TO
JUPITER, HOW LONG WILL IT TAKE THE SIGNAL

479
00:38:37,100 --> 00:38:40,950
FROM THE SPACECRAFT TO ARRIVE?

480
00:38:40,950 --> 00:38:50,430
>> 48 MINUTES SO THE BURN ACTUALLY OCCURS
ANYTIME AFTER ñ WE WILL START RECEIVING THAT

481
00:38:50,430 --> 00:39:00,250
STARTING AT 818 PACIFIC AND THE BURN WOULD
BE RECEIVED PACIFIC GANNETT A 50 3:00 P.M..

482
00:39:00,250 --> 00:39:05,790
>> THERE'S A LOT OF BUZZ ON SOCIAL MEDIA WILL
TURN IT OVER TO EMILY.

483
00:39:05,790 --> 00:39:08,700
WHAT IS A PUBLIC EXCITED ABOUT?

484
00:39:08,700 --> 00:39:10,740
>> SURE WE HAVE A LOT OF QUESTIONS.

485
00:39:10,740 --> 00:39:14,690
THE FIRST ONE COMES FROM MARIELLE AND SHE
ASKS WHAT ARE THE POTENTIAL MISHAPS OR PROBLEMS

486
00:39:14,690 --> 00:39:20,680
OF INSERTION INTO JUNO'S JOURNEY?

487
00:39:20,680 --> 00:39:25,980
>> WELL, ONE OF THE THINGS OF COURSE WE SPENT
A LOT OF TIMES THINKING ABOUT IS RADIATION

488
00:39:25,980 --> 00:39:34,980
EFFECT -- I CAN TELL YOU WE THOUGHT ABOUT
IT ALMOST EVERY DAY.

489

00:39:34,980 --> 00:39:42,750

BUT WE BUILT UP FROM THE RADIATION MODELS,
WE HAVE DONE EXTRA PARTS TESTING, WE PUT ADDITIONAL

490

00:39:42,750 --> 00:39:44,880

SHIELDING ON THE SPACECRAFT.

491

00:39:44,880 --> 00:39:50,100

AND WE PUT A LOT OF THOUGHT INTO HOW IT WILL
RESPOND EVEN THOUGH IT MAY BE ñ HOW TO RESPOND

492

00:39:50,100 --> 00:39:53,250

TO ANY SURPRISES WE MAY GET FROM THE RADIATION.

493

00:39:53,250 --> 00:40:00,520

SO, WE HAVE A 14 DAY ñ ONE OF THE THINGS
WE DO FOR THE INVESTIGATION FOR INSTANCE IS

494

00:40:00,520 --> 00:40:05,150

TO PUT A SPECIAL FEATURE ON BOARD THAT IF
WE WERE TO HAVE A COMPUTER HICK UP, AND WE

495

00:40:05,150 --> 00:40:10,350

DID THE CLOSEST APPROACH TO THE PLANET AND
TEMPORARY LOSS DATA FROM THE ESTIMATES THIS

496

00:40:10,350 --> 00:40:13,090

WOULD AUTOMATICALLY TURN THAT ONE INSTRUMENT
BACK ON.

497

00:40:13,090 --> 00:40:20,490

BECAUSE THE MAGNETIC MAP OF 32 ORBITS IS THE
ONE THAT IS THE MOST CHALLENGING FOR US.

498

00:40:20,490 --> 00:40:24,000

SO THERE A NUMBER OF MEASURES WE HAVE TWO
FACE CHALLENGES AHEAD OF US.

499

00:40:24,000 --> 00:40:35,030
>> THIS IS FROM XAVIER, HE SAYS WILL THERE
BE AMAZING PICTURES AND WILL WE GET TO KNOW

500
00:40:35,030 --> 00:40:37,440
MORE ABOUT WHAT IS UNDER THE CLOUD LAYERS?

501
00:40:37,440 --> 00:40:42,580
>> YES, I CAN ñ I EXPECT WILL HAVE AMAZING
PICTURES.

502
00:40:42,580 --> 00:40:47,570
JUST TO SEE THE FIRST GLIMPSE OF WHAT IT LOOKS
LIKE WILL BE AMAZING BY ITSELF.

503
00:40:47,570 --> 00:40:49,660
WE WILL GET INCREDIBLE PICTURES CLOSE UP.

504
00:40:49,660 --> 00:40:57,260
AND WILL GET THEM NOT JUST IN VISIBLE LIGHT
BUT IN ULTRAVIOLET AND INFRARED.

505
00:40:57,260 --> 00:41:03,590
AND WE HAVE SPECIAL INSTRUMENTATION CALLED
A MICROWAVE RADIOMETER THAT ACTUALLY CAN SEE

506
00:41:03,590 --> 00:41:05,320
BENEATH THE CLOUD TOPS.

507
00:41:05,320 --> 00:41:11,330
SO WE HAVE NEVER REALLY SEEN HOW DEEP THE
ZONES AND BELTS WITH REALLY GO.

508
00:41:11,330 --> 00:41:12,950
WE DO NOT KNOW THOSE ROOTS.

509
00:41:12,950 --> 00:41:18,810
PRESUMABLY THEY ARE TO A VERY DEEP SPOT BECAUSE
OF A STORM THAT HAS LASTED FOR HUNDREDS OF

510
00:41:18,810 --> 00:41:19,810
YEARS.

511
00:41:19,810 --> 00:41:24,350
AND SO INVESTOR MENTATION FOR THE FIRST TIME
THAT IS ACTUALLY GOING TO SEE BENEATH THE

512
00:41:24,350 --> 00:41:25,990
CLOUD TOPS.

513
00:41:25,990 --> 00:41:31,480
WE WILL BE ABLE TO MAKE IMAGES THAT ARE NOT
EXACTLY LIKE YOU WOULD NORMALLY TAKE WITH

514
00:41:31,480 --> 00:41:37,850
YOUR PHONE CAMERAS BUT WE WILL SEE WHAT IT
LOOKS LIKE UNDERNEATH THOSE CLOUDS.

515
00:41:37,850 --> 00:41:40,660
AND HOW DEEP THOSE BELTS GO.

516
00:41:40,660 --> 00:41:43,599
WE'LL GET SOME GREAT STUFF.

517
00:41:43,599 --> 00:41:46,720
>> AND THIS QUESTION IS FROM ANDRE.

518
00:41:46,720 --> 00:41:49,990
HE SAYS WILL JUPITER'S MOON BE STUDIED BY
JUNO?

519
00:41:49,990 --> 00:41:54,450
CAN I JUPITER'S MOONS WILL BE STUDIED A LITTLE
BIT BUT IT IS NOT OUR FOCUS.

520
00:41:54,450 --> 00:41:58,330
OF COURSE THE FOCUS OF THE PLANET ITSELF.

521

00:41:58,330 --> 00:42:02,450
BUT WE ARE ORBITING NEARBY THERE AND THE MOONS
ARE NEARBY.

522
00:42:02,450 --> 00:42:07,600
WE DO NOT GO VERY VERY CLOSE TO THEM SO WE
ARE NOT AGAIN, WE WILL NOT CLOSE-UPS BUT WE

523
00:42:07,600 --> 00:42:11,950
WILL GET SOME DISTANT SHOTS AND THEY WILL
BE UNIT BECAUSE WE WILL BECOME A FROM ABOVE

524
00:42:11,950 --> 00:42:12,950
AND BELOW.

525
00:42:12,950 --> 00:42:16,980
IT HAS NEVER BEEN SEEN FROM THAT DIRECTION.

526
00:42:16,980 --> 00:42:22,840
>> OKAY LET'S GO BACK TO OUR PHONE LINES AND
THEN WILL COME BACK FOR SOME FINAL QUESTIONS.

527
00:42:22,840 --> 00:42:23,840
TRACY WATSON, USA TODAY.

528
00:42:23,840 --> 00:42:24,840
>> THANK YOU.

529
00:42:24,840 --> 00:42:30,780
I JUST WANTED TO ASK THIS IS A NAILBITING
MOMENT, DURING THE ORBIT INSERTION.

530
00:42:30,780 --> 00:42:39,450
WHEN SHOULD ALL OF US BE WATCHING AND WHEN
WILL YOU BE SCRUTINIZING THE NUMBERS MOST

531
00:42:39,450 --> 00:42:42,160
CAREFULLY?

532

00:42:42,160 --> 00:42:48,350

>> I THINK THE PART WE WILL ALL BE WATCHING MOST INTENSELY OF COURSE IS THE MAIN ENGINE

533

00:42:48,350 --> 00:42:50,530

BURN ITSELF.

534

00:42:50,530 --> 00:42:54,750

AND I CAN TELL YOU WHEN THAT COMPLETES YOU WILL SEE A LOT OF CELEBRATION BECAUSE THAT

535

00:42:54,750 --> 00:42:57,540

MEANS WE WILL BE IN ORBIT AROUND JUPITER.

536

00:42:57,540 --> 00:43:00,620

AND THAT WILL BE REALLY COOL.

537

00:43:00,620 --> 00:43:06,090

SO ñ OH, JULY 4TH.

538

00:43:06,090 --> 00:43:13,880

AND AS I SAID EARLIER THE MAIN ENGINE BURN PACIFIC TIME IS 8:18 PM TO 8:53 PM.

539

00:43:13,880 --> 00:43:16,750

>> AND I BELIEVE WE HAVE BILL BACK WITH CBS NEWS.

540

00:43:16,750 --> 00:43:17,750

BILL?

541

00:43:17,750 --> 00:43:21,270

>> YES THANKS, ONE QUICK ONE I GUESS FOR RICK AGAIN.

542

00:43:21,270 --> 00:43:24,150

AND IT IS RELATED TO TRACY'S QUESTION.

543

00:43:24,150 --> 00:43:26,500

WHAT SORT OF MARGIN DO YOU GUYS HAVE ON THE BURN?

544
00:43:26,500 --> 00:43:33,270
IN OTHER WORDS WHAT IS THE DESIGNED BURN TIME.

545
00:43:33,270 --> 00:43:36,520
WHAT IS THE MINIMUM TO ACHIEVE ANY SORT OF USEFUL ñ I GUESS RELATED TO THAT I AM WONDERING

546
00:43:36,520 --> 00:43:40,360
THAT IF YOU DO NOT BURN AT ALL, FOR WHATEVER REASON ñ WHERE DOES THE TRAJECTORY TAKING

547
00:43:40,360 --> 00:43:44,490
WILL THERE BE A CHANCE TO RECOVER?

548
00:43:44,490 --> 00:43:46,740
THANK YOU?

549
00:43:46,740 --> 00:43:49,620
>> A LOT OF QUESTIONS BURIED IN THERE.

550
00:43:49,620 --> 00:43:50,970
WELL TO START WITH THE BURN TIME.

551
00:43:50,970 --> 00:43:57,480
FIRST OF ALL A 35 MINUTE BURN IS A 53 DAY ORBIT.

552
00:43:57,480 --> 00:44:02,310
THE MINIMUM AMOUNT OF BURN THAT WE NEED TO GET INTO ORBIT AT ALL WHICH IS A RATHER LARGE

553
00:44:02,310 --> 00:44:04,980
ORBIT IS 20 MINUTES.

554
00:44:04,980 --> 00:44:09,850
BUT WE PUT ENOUGH SCAPE SAFEGUARDS IN THE

SYSTEM INCLUDING: AUTO RESTART SO THE SYSTEM

555
00:44:09,850 --> 00:44:15,700
IS DESIGNED IF FOR INSTANCE THE RADIATION
CAUSES THE COMPUTER TO RESET AND THE ENGINE

556
00:44:15,700 --> 00:44:19,050
STOPS ñ IT IS NOT DESIGNED TO JUST PROTECT
THE SPACECRAFT.

557
00:44:19,050 --> 00:44:22,890
IT IS DESIGNED FOR THIS ONE PORTION OF THE
MISSION TO RESTART THE BURN.

558
00:44:22,890 --> 00:44:27,060
SO IT WILL DO A QUICK RECYCLE IN 500 SECONDS
AND RESTART THE BURN.

559
00:44:27,060 --> 00:44:32,890
MOST LIKELY WE EXPECT TO GET ALL THE WAY TO
35 MINUTES BUT IF WE DO NOT GET ALL THE WAY

560
00:44:32,890 --> 00:44:35,570
ONE SHOT, WE WILL GET THERE EVENTUALLY.

561
00:44:35,570 --> 00:44:42,930
I CAN TELL YOU THAT OUR PREVIOUS SCIENCE OR
ORBIT WAS 100 MINUTES WHICH IS ABOUT A 30

562
00:44:42,930 --> 00:44:44,160
MINUTE BURN.

563
00:44:44,160 --> 00:44:49,560
EVEN GETTING TO A 30 MINUTE BURN WITHOUT INTERRUPTION
PUTS US IN A FABULOUS SCIENCE ORBIT.

564
00:44:49,560 --> 00:44:52,150
WE'VE NEVER BEEN TO THIS REGION OF THE PLANET.

565

00:44:52,150 --> 00:44:56,600

SO EVEN IF YOU OVER ORBITS GIVES US TREMENDOUS
INFORMATION BUT OF COURSE WE WANT THE WHOLE

566

00:44:56,600 --> 00:44:58,050

ANGELA.

567

00:44:58,050 --> 00:45:02,960

AND THERE WAS A SECOND PART OF THE QUESTION
IF YOU CAN REFRESH MY MEMORY?

568

00:45:02,960 --> 00:45:07,580

>> IF WE DO NOT BURN IT ALL WHERE DO WE END
UP?

569

00:45:07,580 --> 00:45:11,110

>> WE DO NOT END UP IN A VERY EXCITING SPOT.

570

00:45:11,110 --> 00:45:16,870

[LAUGHTER] WE ARE IN ORBIT AROUND THE SUN
ñ WILL GET A NICE DEFLECTION ABOVE THE ECLIPTIC

571

00:45:16,870 --> 00:45:18,410

AND ABOVE THE PLANET.

572

00:45:18,410 --> 00:45:24,250

WE WILL BE TILTED DOWN AND WE HAVE NOT STUDIED
THAT TOO MUCH IN TERMS OF WHERE WE END UP.

573

00:45:24,250 --> 00:45:27,420

WE FOCUSED ON SUCCESS AND NOT FAILURE.

574

00:45:27,420 --> 00:45:29,410

BUT IT IS A GOOD QUESTION.

575

00:45:29,410 --> 00:45:31,700

CAN I GET A ONE-SHOT DEAL.

576

00:45:31,700 --> 00:45:39,740

I MEAN THE WHOLE THING IS WRITING ON THIS
JOI ON JULY 4TH.

577
00:45:39,740 --> 00:45:43,400
SOMEBODY ASKED WHEN DOES THE NAILBITING START?

578
00:45:43,400 --> 00:45:44,740
IT HAS ALREADY STARTED.

579
00:45:44,740 --> 00:45:52,310
[LAUGHTER] I AM GETTING CLOSE, I HAVE A MIXED
EXCITEMENT AND ANTICIPATION WITH TENSION AND

580
00:45:52,310 --> 00:45:53,690
ANXIETY.

581
00:45:53,690 --> 00:45:57,550
AND I FELT THE EXACT SAME THING ON THE DAYS
OF THE LAUNCH.

582
00:45:57,550 --> 00:46:00,340
WHICH WAS PROBABLY OUR HIGHEST RISK IN THE
ENTIRE MISSION.

583
00:46:00,340 --> 00:46:04,260
I THINK THE JUPITER ORBIT INSERTION IS THE
SECOND HIGHEST RISK.

584
00:46:04,260 --> 00:46:05,790
EVERYTHING IS WRITING ON IT.

585
00:46:05,790 --> 00:46:09,630
THIS SPACECRAFT IS VERY COMPLEX.

586
00:46:09,630 --> 00:46:11,090
THIS WAS A GREAT CHALLENGE.

587
00:46:11,090 --> 00:46:14,370
WE ARE GOING LITERALLY WHERE NO ONE HAS GONE

BEFORE.

588
00:46:14,370 --> 00:46:21,670
IT IS THE GREATEST CHALLENGE IN SOME WAYS
BECAUSE JUPITER IS THE MOST EXTREME PLANET

589
00:46:21,670 --> 00:46:22,880
WE HAVE.

590
00:46:22,880 --> 00:46:26,070
AND WE ARE GOING RIGHT NEXT TO IT.

591
00:46:26,070 --> 00:46:34,180
RIGHT INTO ITS GUARDED AREA IS A PLANET ON
STEROIDS EVERY SINGLE THING IS THE MOST EXTREME

592
00:46:34,180 --> 00:46:40,790
IT HAS THE STRONGEST MAGNETIC FIELD IT WHIPS
THIS AROUND THE FASTEST IT HAS THE MOST INTENSE

593
00:46:40,790 --> 00:46:44,620
RADIATION WE ARE MOVING FASTER.

594
00:46:44,620 --> 00:46:49,600
IN FACT ANY HUMAN OBJECT THIS IS FASTER THAN
THE HAS EVER GONE.

595
00:46:49,600 --> 00:46:55,970
EVERYTHING ABOUT IT, WE HAVE TO DO THE EXTREME
AND IT HAS TO DO THE EXTREME BUT WE HAVE TAKEN

596
00:46:55,970 --> 00:47:00,730
EVERY HUMAN INGENUITY IDEA AND PUT INTO THIS.

597
00:47:00,730 --> 00:47:01,730
RIGHT?

598
00:47:01,730 --> 00:47:06,850
AND WE PUT TOGETHER AN ARMORED TANK GOING

TO JUPITER.

599

00:47:06,850 --> 00:47:08,530

SO WE ARE SHIELDED AND READY.

600

00:47:08,530 --> 00:47:13,320

BUT THERE IS DEFINITELY RISK.

601

00:47:13,320 --> 00:47:23,340

>> AND LET ME REMIND OUR STUDIO FOLKS HERE

AND WATCHING US THAT GO TO THE WEBSITE, www.NASA.gov/JUNO.

602

00:47:23,340 --> 00:47:28,290

JUPITER INTO THE UNKNOWN IS A TWO MINUTE VIDEO

THAT YOU WILL TRULY SEE WHAT THIS TEAM, WE

603

00:47:28,290 --> 00:47:31,160

TALK ABOUT NAILBITING AND DRAMA.

604

00:47:31,160 --> 00:47:43,480

WHEN WE CONCLUDE HERE, GET YOUR COMPUTER,

GET TO THE INTERNET.

605

00:47:43,480 --> 00:48:00,430

>> THE OTHER QUESTION HAS TO DO WITH THE STAR

TRACKER CAMERA THAT HEIDI WAS TALKING ABOUT

606

00:48:00,430 --> 00:48:07,350

EARLIER.

607

00:48:07,350 --> 00:48:14,770

THERE ARE FOUR OTHER STAR TRACKERS ON THE

MAGNETOMETER ARM THAT ARE JUST FOR POINTING

608

00:48:14,770 --> 00:48:21,840

PURPOSES OR ñ BUT THEY ARE NOT INVOLVED IN

NAVIGATION.

609

00:48:21,840 --> 00:48:29,440

SO THOSE ARE THE TWO QUESTIONS.

610
00:48:29,440 --> 00:48:35,940
>> SO I WILL TAKE THE JUNO CAM AND THE MAGNETIC
START CAMERAS FOR YOU AND WE WILL HEIDI TAKE

611
00:48:35,940 --> 00:48:38,570
CARE OF THE MAIN STAR TRACKER.

612
00:48:38,570 --> 00:48:48,350
SO, JUNO CAM IS A COPY, A CLOSE COPY BUT NOT
AN EXACT COPY OF ALL THE CAMERAS THAT HAVE

613
00:48:48,350 --> 00:48:55,730
BEEN FLOWN TO MARS BY A COMPANY MAIL AND SPACE
SCIENCES.

614
00:48:55,730 --> 00:49:00,340
WHEN WE WENT TO THEM, WE WENT TO GET SOMETHING
THAT WE COULD USE FOR THE PUBLIC AND GET GREAT

615
00:49:00,340 --> 00:49:06,030
IMAGES I COULD NOT IMAGINE WE WILL GO THIS
WAY AND NOT SEE WHAT THEIR HOLES LOOK LIKE.

616
00:49:06,030 --> 00:49:11,410
AND THEY AGREE TO MAKE BASICALLY A COPY OF
SOMETHING THAT WAS ON MARS.

617
00:49:11,410 --> 00:49:13,820
IT WAS NOT TAKEN AND REPURPOSED.

618
00:49:13,820 --> 00:49:16,900
IT WAS SPECIFICALLY DESIGNED AND BUILT FOR
OUR MISSION.

619
00:49:16,900 --> 00:49:21,400
BUT IT'S BASIC DESIGN WAS TAKEN FROM MARS
MISSIONS.

620

00:49:21,400 --> 00:49:22,710

WHAT IT DID NOT ñ IT HAD TO BE SPECIALIZED.

621

00:49:22,710 --> 00:49:28,190

BECAUSE THERE IS A DIFFERENT RADIATION AND WE ARE SPINNING.

622

00:49:28,190 --> 00:49:35,530

THE SECOND PART OF THE QUESTION I'LL TAKE IS THE FOUR-STAR CAMERAS THAT ARE TIED TO

623

00:49:35,530 --> 00:49:37,890

THE MAGNETOMETER INVESTIGATION.

624

00:49:37,890 --> 00:49:40,360

THAT IS THE END OF ONE OF OUR SOLAR RAYS.

625

00:49:40,360 --> 00:49:44,040

YOU WILL SEE THAT ONE OF THEM LOOKS A LITTLE DIFFERENT ON THE END THAN THE REST.

626

00:49:44,040 --> 00:49:49,540

THAT IS BECAUSE IT IS AN OPTICAL BENCH WHERE HE HOUSE THE MAGNETIC FIELD INVESTIGATION.

627

00:49:49,540 --> 00:49:52,320

THERE ARE TWO SENSORS THAT MEASURE THE MAGNETIC FIELD.

628

00:49:52,320 --> 00:49:57,690

THAT MAGNETIC FIELD MEASUREMENT IS A LITTLE BIT LIKE WHAT YOU GET AT THE AIRPORT WHEN

629

00:49:57,690 --> 00:50:00,970

TSA CHECKS TO SEE IF YOU GOT ANY METAL ON YOU.

630

00:50:00,970 --> 00:50:07,570

THEY BASICALLY HAVE MORE BASIC MAGNETOMETERS

BUT THEY ARE LOOKING TO SEE IF THE MAGNETIC

631

00:50:07,570 --> 00:50:09,160

FIELD GETS DISTORTED.

632

00:50:09,160 --> 00:50:11,790

THEN THEY KNOW YOU HAVE METAL IN YOUR POCKET.

633

00:50:11,790 --> 00:50:13,630

HOURS ARE A LITTLE MORE PRECISE.

634

00:50:13,630 --> 00:50:18,710

THEY ARE IN FACT THE MOST PROTECT PRECISE
MAGNETOMETERS EVER DESIGNED.

635

00:50:18,710 --> 00:50:22,210

THEY ARE AT THE EDGE OF ONE OF THESE LONG
SOLAR RAYS.

636

00:50:22,210 --> 00:50:28,530

THE REASON WE HAVE FOUR STAR TRACKERS OUT
THERE IS BECAUSE WE WANT TO LOCATE EXACTLY

637

00:50:28,530 --> 00:50:31,480

WHERE THOSE MAGNETOMETERS ARE WHEN THEY MAKE
THEIR MEASUREMENT.

638

00:50:31,480 --> 00:50:36,690

BECAUSE THEY ARE MAPPING VERY PRECISELY, MORE
PRECISE THAN ANY PREVIOUS THAT HAS EVER BEEN

639

00:50:36,690 --> 00:50:37,690

DONE.

640

00:50:37,690 --> 00:50:42,390

THE MAGNETIC FIELD OF JUPITER AND WE WANT
TO KNOW EXACTLY WHICH WAY THE VECTORS ARE

641

00:50:42,390 --> 00:50:47,660

POINTING IN THIS INVISIBLE FORCE FIELD SO
THAT IT TELLS US SOMETHING ABOUT THE STRUCTURE

642
00:50:47,660 --> 00:50:50,240
OF JUPITER AND HAVE THE MAGNETIC FIELDS ARE
FORMED.

643
00:50:50,240 --> 00:50:58,350
AND SO THOSE CAMERAS ARE THERE TO DETECT ANY
SLIGHT MOVEMENT IN THE SOLAR RAYS IF THEY

644
00:50:58,350 --> 00:51:01,470
ARE TO BEND OR GET DEFLECTED IN ANY WAY.

645
00:51:01,470 --> 00:51:06,120
THEY WILL LOCATE EXACTLY WHERE THE MAGNETOMETERS
ARE BEING MEASURED COMPARED TO THE MAIN BODY

646
00:51:06,120 --> 00:51:07,700
OF THE SPACECRAFT.

647
00:51:07,700 --> 00:51:12,869
AND THOSE START CAMERAS OR STAR TRACKERS ARE
CALLED ADVANCED COMPASSES.

648
00:51:12,869 --> 00:51:18,119
THEY WERE BUILT IN DENMARK BY DANISH TECHNICAL
UNIVERSITY.

649
00:51:18,119 --> 00:51:22,030
THEY ARE VERY SPECIAL CAMERAS BECAUSE THEY
ARE MAGNETICALLY CLEAN.

650
00:51:22,030 --> 00:51:25,910
IN OTHER WORDS, THEY DO NOT INTERFERE WITH
THE MEASUREMENT OF THE MAGNETOMETER.

651
00:51:25,910 --> 00:51:30,800
SO SOME CAMERAS GIVE UP THEIR OWN MAGNETIC
FIELD AND SO WE HAD TO BE VERY CAREFUL TO

652
00:51:30,800 --> 00:51:34,870
GET ONES THAT WERE WHAT WE CALL MAGNETICALLY
CLEAN.

653
00:51:34,870 --> 00:51:38,240
AND NOW I'LL TURN IT OVER TO HEIDI TO ANSWER
THE OTHER PART OF THE QUESTION.

654
00:51:38,240 --> 00:51:43,690
>> Heidi: AND THE STAR TRACKER THAT I WAS
TALKING ABOUT WAS THE SPACECRAFT STELLAR REFERENCE

655
00:51:43,690 --> 00:51:44,690
UNIT.

656
00:51:44,690 --> 00:51:49,620
THAT IS THE STAR TRACKER THAT SUPPORTS ATTITUDE
DETERMINATION FOR JUNO.

657
00:51:49,620 --> 00:51:54,460
IT WAS MADE BY A COMPANY CALLED SELLECK'S
GALILEO AND FLORENCE ITALY.

658
00:51:54,460 --> 00:51:58,480
THAT IS OUR OTHER ITALIAN INSTRUMENT ON JUNO.

659
00:51:58,480 --> 00:52:02,849
>> WE WILL TAKE TWO MORE AND THEN WE WILL
WRAP UP.

660
00:52:02,849 --> 00:52:08,900
>> THIS IS FROM JAY AND HE ASKED WHY WILL
JUNO DEORBIT IN 2018 AFTER LESS THAN TWO YEARS

661
00:52:08,900 --> 00:52:16,619
OF ORBITING JUPITER?

662
00:52:16,619 --> 00:52:22,630

>> ONE OF NASA'S INVESTIGATION OR FUTURE MISSIONS
THAT THEY WANT TO TAKE IS A MISSION TO ONE

663

00:52:22,630 --> 00:52:24,520
OF JUPITER'S MOONS EUROPA.

664

00:52:24,520 --> 00:52:27,060
AND SUSPECTED LIFE UNDERNEATH THE OCEAN.

665

00:52:27,060 --> 00:52:33,980
BUT THE LAST THING YOU WANT TO HAVE HAPPEN
IS TO GET THERE AND FIND OUT IT HAS BEEN CONTAMINATED

666

00:52:33,980 --> 00:52:35,130
BY ORGANISMS.

667

00:52:35,130 --> 00:52:38,910
AND SO THEY HAVE A PROGRAM CALLED PLANETARY
PROTECTION.

668

00:52:38,910 --> 00:52:44,300
AND ONE OF THE REQUIREMENTS WE HAVE IS A VERY
LOW LIKELIHOOD THAT WE WILL EVER GET TO EUROPA

669

00:52:44,300 --> 00:52:46,180
AND CONTAMINATED.

670

00:52:46,180 --> 00:52:54,470
SO WE DESIGNED A MISSION THAT AFTER WE COMPLETE
OUR 32 SCIENCE ORBITS, WE WILL GO OUT TO THE

671

00:52:54,470 --> 00:52:58,270
FARTHEST PLAN AND THE ORB AND TAKE SOME ENERGY
OUT OF THE ORBIT AND THE NEXT TIME WE WILL

672

00:52:58,270 --> 00:53:01,410
GO INTO JUPITER.

673

00:53:01,410 --> 00:53:05,730

DESTROYING THE SPACECRAFT THAT WAY IS THE
WAY THAT WE HOPE --

674
00:53:05,730 --> 00:53:11,990
>> ALL RIGHT, THIS QUESTION IS FOR MELISSA
AND SHE ASKS HOW DOES A BETTER UNDERSTANDING

675
00:53:11,990 --> 00:53:16,940
OF JUPITER UNRAVELED THE ORIGINS OF EARTH
OR OUR SOLAR SYSTEM?

676
00:53:16,940 --> 00:53:21,650
>> WELL, WE DO NOT KNOW EXACTLY HOW JUPITER
WAS MADE.

677
00:53:21,650 --> 00:53:26,119
AND WE DO NOT UNDERSTAND HOW IT IS AND REACHED
IN THESE ELEMENTS OF CARBON, NITROGEN AND

678
00:53:26,119 --> 00:53:27,119
SULFUR.

679
00:53:27,119 --> 00:53:30,930
AND WE DO NOT KNOW ACTUALLY HOW MUCH OXYGEN
OR WATER IS IN JUPITER.

680
00:53:30,930 --> 00:53:34,510
AT THE SAME TIME, WE DO NOT UNDERSTAND HOW
EARTH GOT ITS WATER.

681
00:53:34,510 --> 00:53:38,590
WE HAVE SOME THEORIES, SOME PEOPLE THOUGHT
WAS COMETS BUT THE COMMENTS THAT WE HAVE MEASURED

682
00:53:38,590 --> 00:53:39,590
DO NOT FIT.

683
00:53:39,590 --> 00:53:43,010
AND MAY NOT HAVE BEEN COMETS, MAYBE IT WAS
ASTEROIDS.

684
00:53:43,010 --> 00:53:46,640
MAYBE WHAT SUPPLIED THE WATER IS NOT OUT THERE
ANYMORE.

685
00:53:46,640 --> 00:53:52,180
BUT WHEN YOU GO TO STUDY JUPITER AND LEARN
ABOUT HOW IT FORMED, WHAT YOU ARE REALLY LEARNING

686
00:53:52,180 --> 00:53:54,790
ABOUT IS THE HISTORY OF THOSE MOLECULES.

687
00:53:54,790 --> 00:53:57,580
THOSE ELEMENTS THAT EVENTUALLY MADE US.

688
00:53:57,580 --> 00:54:03,050
WE'RE LEARNING ABOUT WHAT STATE AND HOW THEY
MAY HAVE BEEN DISTRIBUTED EARLY IN THE SOLAR

689
00:54:03,050 --> 00:54:08,710
SYSTEM WHICH WILL FOLD INTO MODELS OF HOW
YOU NOT ONLY MAKE JUPITER BUT HOW YOU EVENTUALLY

690
00:54:08,710 --> 00:54:11,800
MAKE THE OTHER PLANETS.

691
00:54:11,800 --> 00:54:12,850
>> OKAY THAT WILL DO IT.

692
00:54:12,850 --> 00:54:18,140
I WANT TO REMIND THE MANY FOLKS WATCHING US
THAT THERE IS YET ANOTHER REASON TO SAVE THE

693
00:54:18,140 --> 00:54:19,460
DATE ON JULY 4TH.

694
00:54:19,460 --> 00:54:22,400
IT IS GOING TO BE INCREDIBLE.

695

00:54:22,400 --> 00:54:29,340

COME AND JOIN THE RIDE, GO TO THE WEBSITE
FOR MORE INFORMATION AND UPDATES AT www.NASA.gov/JUNO

696

00:54:29,340 --> 00:54:33,529

.
MISSION JUNO.

697

00:54:33,529 --> 00:54:37,040

-- THE COUNTDOWN TO JUPITER HAS OFFICIALLY
BEGUN.

698

00:54:37,040 --> 00:54:40,960

JOIN US, WE WILL SEE YOU IN CALIFORNIA ON
JULY 4TH.

699

00:54:40,960 --> 00:54:45,099

THANK YOU.