

SOCIAL

NEW HORIZONS
The First Mission to the Pluto System

The
Year of
Pluto

SOCIAL



#askNASA

1
00:00:16,049 --> 00:00:17,049
NASA.

2
00:00:17,049 --> 00:00:18,049
NEW HORIZONS PLUTO.

3
00:00:18,049 --> 00:00:19,049
JASON TOWNSEND.

4
00:00:19,049 --> 00:00:20,049
NASA SOCIAL MEDIA TEAM.

5
00:00:20,049 --> 00:00:21,049
MIKE RYSCHKEWITSCH.

6
00:00:21,049 --> 00:00:22,049
SPACE EXPLORATION.

7
00:00:22,049 --> 00:00:23,049
EXPLORATION.

8
00:00:23,049 --> 00:00:24,049
JOHNS HOPKINS UNIVERSITY.

9
00:00:24,049 --> 00:00:25,049
APPLIED PHYSICS LAB.

10
00:00:25,049 --> 00:00:26,049
LAUREL, MARYLAND.

11
00:00:26,049 --> 00:00:27,049
JIM GREEN.

12
00:00:27,049 --> 00:00:28,049
NASA DIRECTOR OF PLANETARY
SCIENCE.

13

00:00:28,049 --> 00:00:29,049
ALAN STERN.

14
00:00:29,049 --> 00:00:30,049
SOUTH WEST RESEARCH INSTITUTE.

15
00:00:30,049 --> 00:00:31,049
INSTITUTE.

16
00:00:31,049 --> 00:00:32,049
HERSMAN.

17
00:00:32,049 --> 00:00:33,049
MISSION SYSTEMS ENGINEER.

18
00:00:33,049 --> 00:00:34,049
JOHNS HOPKINS UNIVERSITY,
APPLIED PHYSICS LAB.

19
00:00:34,049 --> 00:00:35,049
KIMMEN CO.

20
00:00:35,049 --> 00:00:36,049
KIM.

21
00:00:36,049 --> 00:00:37,049
EN COHUSSY HUSSEY.

22
00:00:37,049 --> 00:00:38,049
JET PROPULSION LABORATORY.

23
00:00:38,049 --> 00:00:39,049
PASADENA, CALIFORNIA.

24
00:00:39,049 --> 00:00:40,049
HUSSEY.

25
00:00:40,049 --> 00:00:41,049

ENNICO.

26

00:00:41,049 --> 00:00:42,049

NEW HORIZONS 37 NEW HORIZONS.

27

00:00:42,049 --> 00:00:43,049

RAOEURB.

28

00:00:43,049 --> 00:00:44,049

EUROPA.

29

00:00:44,049 --> 00:00:45,049

CHARON.

30

00:00:45,049 --> 00:00:46,049

KUIPER BELT.

31

00:00:46,049 --> 00:00:47,049

NEPTUNE.

32

00:00:47,049 --> 00:00:48,049

ELLIPTICAL.

33

00:00:48,049 --> 00:00:49,049

AOE KHREUB PARTICULAR.

34

00:00:49,049 --> 00:00:50,049

ECLIPTIC.

35

00:00:50,049 --> 00:00:51,049

ASTRONOMICAL.

36

00:00:51,049 --> 00:00:52,049

DENIZEN.

37

00:00:52,049 --> 00:00:53,049

DENIZENS.

38
00:00:53,049 --> 00:00:54,049
SOUTHWEST RESEARCH INSTITUTE.

39
00:00:54,049 --> 00:00:55,049
NEW HORIZONS TELESCOPE.

40
00:00:55,049 --> 00:00:56,049
PUPPET PUPPET.

41
00:00:56,049 --> 00:00:57,049
PUPPETEER PUPPETEER.

42
00:00:59,049 --> 00:00:58,049
PUPPETEER.

43
00:01:01,049 --> 00:01:00,049
TEST TEST TEST TEST TEST TEST
TEST TEST TEST TEST TEST TEST

44
00:01:01,049 --> 00:01:02,049
TEST TEST TEST TEST TESTTEST

45
00:01:14,060 --> 00:01:03,049
TEST TEST TEST TEST TEST TEST
TEST TEST TEST

46
00:01:14,060 --> 00:01:15,060
TEST TEST TEST.

47
00:01:15,060 --> 00:01:16,730
\\MM
FIVE, FOUR, THREE, TWO, ONE.

48
00:01:16,730 --> 00:01:19,410
AND LIFTOFF OF NASA'S NEW
HORIZONS SPACECRAFT AND BEYOND.

49
00:01:19,410 --> 00:01:20,410

\MM

>>> HELLO.

50

00:01:20,410 --> 00:01:22,800

WELCOME TO THE APPLIED PHYSICS
LABORATORY HERE IN LAUREL,

51

00:01:22,800 --> 00:01:23,800

MARYLAND.

52

00:01:23,800 --> 00:01:29,470

TODAY WILL BE GO A DEEP DIVE
INTO PLUTO AND NASA'S NEW

53

00:01:29,470 --> 00:01:31,110

HORIZONS MISSION.

54

00:01:31,110 --> 00:01:35,100

WE'RE ALSO JOINED BY OUR FRIENDS
WHO ARE FOLLOWING ONLINE AT

55

00:01:35,100 --> 00:01:37,910

LOWELL OBSERVATORY IN FLAGSTAFF,
ARIZONA WHERE PLUTO WAS

56

00:01:37,910 --> 00:01:40,370

DISCOVERED MANY, MANY YEARS AGO.

57

00:01:40,370 --> 00:01:44,720

FOR THOSE OF YOU JOINING US
ONLINE, WE WILL LOOK AT THE

58

00:01:44,720 --> 00:01:48,750

SCIENCE, THE ENGINEERING AND
SOME OF THE NEW THINGS NEW

59

00:01:48,750 --> 00:01:55,850

HORIZONS WILL BE DOING FOR A
JULY 14th FLY-BY OF PLUTO.

60
00:01:55,850 --> 00:01:58,620
IF YOU'RE FOLLOWING ONLINE THE
CONVERSATION IS BEING DONE WITH

61
00:01:58,620 --> 00:02:04,580
#NASASOCIAL.

62
00:02:04,580 --> 00:02:12,480
WE'RE GOING TO BE TALKING ABOUT
THE MISSION USING #PLUTOFLYBY.

63
00:02:12,480 --> 00:02:16,260
YOU CAN JOIN US AT AT ATNASANEW
HORIZONS ON TWITTER AND

64
00:02:16,260 --> 00:02:18,030
FACEBOOK.

65
00:02:18,030 --> 00:02:23,010
WITHOUT FURTHER ADO, WE WILL
JUMP RIGHT INTO IT HERE.

66
00:02:23,010 --> 00:02:26,310
FIRST UP TO WELCOME US TODAY,
FROM THE APPLIED PHYSICS

67
00:02:26,310 --> 00:02:32,410
LABORATORY IS THE HEAD OF SPACE
EXPLORATION MIKE RYSCHKEWITSCH.

68
00:02:32,410 --> 00:02:34,110
>> GOOD AFTERNOON.

69
00:02:34,110 --> 00:02:37,730
WE'RE HAPPY TO HAVE YOU HERE AT
THE JOHNS HOPKINS APPLIED

70
00:02:37,730 --> 00:02:40,260
PHYSICS LAB.

71
00:02:40,260 --> 00:02:47,040
I WOULD LIKE TO TELL YOU A
LITTLE BIT ABOUT JOHNS HOPKINS

72
00:02:47,040 --> 00:02:49,950
APPLIED PHYSICS LAB JOURNEY INTO
SPACE.

73
00:02:49,950 --> 00:02:54,280
IT ACTUALLY BEGINS DURING THE
DEPTHS OF WORLD WAR II.

74
00:02:54,280 --> 00:02:59,470
THE LAB WAS FOUNDED TO WORK ON
PROXIMITY USES FOR NAVAL ANTI

75
00:02:59,470 --> 00:03:01,450
AIRCRAFT GUNS.

76
00:03:01,450 --> 00:03:03,540
THAT INVENTION WAS DEEMED AS ONE
OF THE THREE MOST

77
00:03:03,540 --> 00:03:07,080
TECHNOLOGICALLY IMPORTANT IN
WORLD WAR II, WITH ATOMIC BOMB

78
00:03:07,080 --> 00:03:09,130
AND RADAR.

79
00:03:09,130 --> 00:03:16,430
JAMES VAN ALLEN, FOR WHOM THE
RADIATION BELTS ARE NAMED.

80
00:03:16,430 --> 00:03:18,870
AND
JIM GREEN, ONE OF THE STUDENTS,

81

00:03:18,870 --> 00:03:23,430
IN A COUPLE OF MINUTES, STARTED
USING THE GERMAN B-2s BROUGHT

82
00:03:23,430 --> 00:03:27,000
OVER HERE AFTER THE YEAR TO
BEGIN THE EXPLORATION OF SPACE

83
00:03:27,000 --> 00:03:31,600
LEVERAGING ON THE ELECTRONICS
THAT THEY HAD DEVELOPED FOR

84
00:03:31,600 --> 00:03:36,840
THESE ANTI AIRCRAFT SHELLS AND
BEGAN THE EXPLORATION WITH THE

85
00:03:36,840 --> 00:03:38,740
UNDERSTANDING BOTH OF SPACE.

86
00:03:38,740 --> 00:03:44,770
FAST FORWARD A FEW MORE YEARS,
SOME OF THE SCIENTISTS AND

87
00:03:44,770 --> 00:03:47,870
ENGINEERS AT THE LAB WERE
TRACKING SPUTNIK AND LISTENING

88
00:03:47,870 --> 00:03:51,860
TO THE RADIO SIGNALS IN REAL
LIFE THEY COULD ACTUALLY TRACK

89
00:03:51,860 --> 00:03:55,660
THE SATELLITE BY LISTENING
WORKING ON THE DOPPLER SHIFT OF

90
00:03:55,660 --> 00:03:57,140
THE RADIO SIGNALS.

91
00:03:57,140 --> 00:03:59,300
AND THEN THEY HAD THE BRAINSTORM

THAT THEY COULD TURN THAT

92

00:03:59,300 --> 00:04:00,300
PROCESS AROUND.

93

00:04:00,300 --> 00:04:03,520
IF THEY WERE ON THE GROUND AND
COULD FIGURE OUT WHERE THE

94

00:04:03,520 --> 00:04:06,470
SATELLITE WAS, THEY WOULD BE
ABLE TO FIGURE OUT WHERE SOME

95

00:04:06,470 --> 00:04:07,810
POINT ON THE GROUND WAS.

96

00:04:07,810 --> 00:04:11,400
THAT LED TO BEING ABLE TO SOLVE
A CRITICAL PROBLEM FOR THE NAVY

97

00:04:11,400 --> 00:04:13,550
AND THE NAVIGATION.

98

00:04:13,550 --> 00:04:16,269
THAT REALLY PUT US INTO THE
SPACE BUSINESS.

99

00:04:16,269 --> 00:04:19,799
AND I'M NOT GOING TO GO THROUGH
ALL THE DOZENS AND DOZENS OF

100

00:04:19,799 --> 00:04:22,790
SPACE MISSIONS THAT†--
SPACECRAFT WE HAVE LAUNCHED IN

101

00:04:22,790 --> 00:04:23,790
BETWEEN.

102

00:04:23,790 --> 00:04:26,270

I WILL JUST TALK ABOUT A FEW
CURRENT ONES.

103

00:04:26,270 --> 00:04:31,050

WE DO A LOT OF HELIOPHYSICS AND
PLANETARY SIDE.

104

00:04:31,050 --> 00:04:36,660

WE ARE IN THE FULL THROES OF
SOLO PLEX MISSION.

105

00:04:36,660 --> 00:04:40,279

YOU MIGHT WANT TO LOOK AT THAT.

106

00:04:40,279 --> 00:04:48,190

WE WILL GO WITHIN 10 SOLAR RDI
TO UNDERSTAND HOW THE CORONA IS

107

00:04:48,190 --> 00:04:53,240

HEAT AND THE SOLAR WINDS ARE
GENERATED.

108

00:04:53,240 --> 00:04:58,550

A LITTLE MORE CLOSER TO HOME,
WE'VE GOT FINISHED THE MESSENGER

109

00:04:58,550 --> 00:04:59,610

MISSION TO MERCURY.

110

00:04:59,610 --> 00:05:02,979

WE HAD A REALLY WONDERFULLY
SUCCESSFUL MISSION.

111

00:05:02,979 --> 00:05:06,360

UNFORTUNATELY, OUR FUEL SUPPLY
WAS FINITE AND WE DID WHAT WE

112

00:05:06,360 --> 00:05:10,629

CALL THE SPLAT INTO THE SURFACE
A FEW WEEKS AGO.

113

00:05:10,629 --> 00:05:16,620

MERCURY AND MESSENGER ARE A
LITTLE BIT HARBINGER.

114

00:05:16,620 --> 00:05:22,439

WE KNEW ABOUT THAT MUCH ABOUT
MERCURY.

115

00:05:22,439 --> 00:05:26,419

THE OTHER SIDE OF THE PLANET WE
DIDN'T KNOW ANYTHING ABOUT.

116

00:05:26,419 --> 00:05:31,490

YOU HAVE A HIGH-RES VERSION ON
YOUR SCREEN BUT WE HAVE MERCURY

117

00:05:31,490 --> 00:05:33,180

AND A LOT OF DETAILED KNOWLEDGE.

118

00:05:33,180 --> 00:05:37,629

THAT'S JUST THE VISUAL
REPRESENTATION.

119

00:05:37,629 --> 00:05:40,650

BECAUSE THE SCIENTIFIC
DISCOVERIES OF WATER ICE AT THE

120

00:05:40,650 --> 00:05:44,550

POLES AND THE CRATERS, THINGS
LIKE THAT, ARE POSITIVELY MIND

121

00:05:44,550 --> 00:05:45,550

BOGGLING.

122

00:05:45,550 --> 00:05:48,520

I'M REALLY EXCITED TO BE HERE
WITH YOU.

123

00:05:48,520 --> 00:05:51,259
HOPEFULLY YOU'LL BE FOLLOWING US
THE NEXT FEW WEEKS.

124
00:05:51,259 --> 00:05:55,229
BECAUSE WHAT WE'RE GOING TO
LEARN ABOUT PLUTO OVER THE NEXT

125
00:05:55,229 --> 00:05:58,490
WEEKS AND MONTHS AS ALL THE DATA
GETS DOWNLOADED IS REALLY

126
00:05:58,490 --> 00:05:59,490
EXCITED TO ME.

127
00:05:59,490 --> 00:06:03,199
RIGHT NOW IT KIND OF LOOKS LIKE
THAT.

128
00:06:03,199 --> 00:06:05,940
AS WE FILL THAT IN, IT'S REALLY
GOING TO BE AMAZING.

129
00:06:05,940 --> 00:06:08,409
SO THANK YOU FOR BEING HERE THIS
AFTERNOON.

130
00:06:08,409 --> 00:06:11,490
THANK YOU FOR FOLLOWING US AND
SHARING OUR ADVENTURE WITH THE

131
00:06:11,490 --> 00:06:14,410
WORLD.

132
00:06:14,410 --> 00:06:17,339
WELCOME.

133
00:06:17,339 --> 00:06:18,919
>> WONDERFUL TO SET THE MOOD
JUST A LITTLE BIT.

134

00:06:18,919 --> 00:06:28,179

WE HAVE A QUICK VIDEO TO
INTRODUCE PLUTO.

135

00:06:28,179 --> 00:06:31,819

>> THERE'S A MYSTERIOUS ZONE FAR
OUT IN OUR SOLAR SYSTEM.

136

00:06:31,819 --> 00:06:35,340

IT'S A REGION OF ICE WORLDS.

137

00:06:35,340 --> 00:06:37,650

SOME SOLITARY, SOME WITH MOONS.

138

00:06:37,650 --> 00:06:40,210

THEIR NAMES FAMILIAR.

139

00:06:40,210 --> 00:06:41,930

AIR EUS.

140

00:06:41,930 --> 00:06:43,639

HOLE MAYO.

141

00:06:43,639 --> 00:06:49,030

THEY HOLD CLUES TO ALL OUR
ORIGINS AND THE FIRST OF THESE

142

00:06:49,030 --> 00:06:53,590

WORLDS AND THE ONE WE WILL REACH
IN 2015 IS THE KIN OF THE KUIPER

143

00:06:53,590 --> 00:06:56,819

BELT, PLUTO.

144

00:06:56,819 --> 00:07:00,750

THE LONG JOURNEY OF NASA'S NEW
HORIZONS MISSION BEGAN IN 2006

145

00:07:00,750 --> 00:07:04,520

ABOARD AMERICA'S BIGGEST,
BADDEST ROCKET, TRICKED OUT WITH

146

00:07:04,520 --> 00:07:06,099

EVERY CONCEIVABLE BOOSTER.

147

00:07:06,099 --> 00:07:08,969

>> WE HAVE A VERY LIGHT
SPACECRAFT AND BOUGHT A VERY

148

00:07:08,969 --> 00:07:10,159

LARGE LAUNCH VEHICLE.

149

00:07:10,159 --> 00:07:12,080

AND THE COMBINATION IS
FEROCIOUS.

150

00:07:12,080 --> 00:07:16,280

>> BUT IN SOME SENSE, IT ALL
BEGAN IN 1930, WITH CLYDE TOM

151

00:07:16,280 --> 00:07:20,389

VALUE, 24 YEARS OLD, AND FRESH
OFF THE FARM IN KANSAS, BUT

152

00:07:20,389 --> 00:07:24,280

WILLING TO SPEND LONG HOURS
SCANNING STAR FIELDS TO FIND THE

153

00:07:24,280 --> 00:07:26,949

MOVING POINT OF LIGHT.

154

00:07:26,949 --> 00:07:30,610

HUMANITY'S FIRST GLIMPSE OF
PLUTO.

155

00:07:30,610 --> 00:07:35,979

IT BEGAN WITH WITH A 6-YEAR-OLD

BOY IN LOVE WITH SCIENCE WHO

156

00:07:35,979 --> 00:07:41,099

GREW UP TO LEAD A TEAM OF
BRILLIANT RESEARCHERS AND

157

00:07:41,099 --> 00:07:44,139

ENGINEERS WITH DOGGED PERSISTENT
AND DECADES OF BUILDING AND

158

00:07:44,139 --> 00:07:47,809

TESTS, A RACE AGAINST TIME JUST
TO GET TO THE LAUNCH PAD.

159

00:07:47,809 --> 00:07:50,501

>> EXPLORING THE OUTER SOLAR
SYSTEM, BECAUSE IT'S SO FAR,

160

00:07:50,501 --> 00:07:51,749

TAKES A LOT OF TIME.

161

00:07:51,749 --> 00:07:56,689

IT REQUIRES A LOT OF PATIENCE, A
LOT OF DEDICATION, A LOT OF

162

00:07:56,689 --> 00:07:57,689

PERSEVERANCE.

163

00:07:57,689 --> 00:07:58,689

BUT IT'S A FRONTIER.

164

00:07:58,689 --> 00:08:02,530

>> ASSUMING ALL GOES WELL AT
PLUTO, NASA MAY EXTEND THE

165

00:08:02,530 --> 00:08:06,839

ADVENTURE FURTHER OUT IN THE
KUIPER BELT INTO THE MYSTERIOUS

166

00:08:06,839 --> 00:08:07,839

THIRD ZONE.

167

00:08:07,839 --> 00:08:11,699

>> THIS MAY BE THE ONE CHANCE IN
MY LIFETIME THAT WE WILL GET THE

168

00:08:11,699 --> 00:08:14,659

SPACECRAFT OUT THERE AND LOOK UP
CLOSE AT ONE OF THE KUIPER BELT

169

00:08:14,659 --> 00:08:15,659

OBJECTS.

170

00:08:15,659 --> 00:08:18,120

>> DECEMBER 6th, 2014.

171

00:08:18,120 --> 00:08:24,059

NEW HORIZONS WAKES UP FOR THE
LAST TIME FROM HIBERNATION.

172

00:08:24,059 --> 00:08:28,229

>> NEW HORIZONS IS SPEEDING
TOWARDS PLUTO AT A PHENOMENAL

173

00:08:28,229 --> 00:08:29,229

RATE.

174

00:08:29,229 --> 00:08:30,690

WE CAN'T WAIT FOR IT TO GET
THERE.

175

00:08:30,690 --> 00:08:35,050

>> JANUARY 27, 2015, SINCE
MONTHS OF APPROACHED SCIENCE

176

00:08:35,050 --> 00:08:36,050

BEGAN.

177

00:08:36,050 --> 00:08:42,550
JULY 14th, 2015, NEW HORIZONS'S
LONG JOURNEY, 3 BILLION MILES,

178

00:08:42,550 --> 00:08:48,580
NINE YEARS IN FLIGHT, AND 85
YEARS OF SPECULATION ABOUT PLUTO

179

00:08:48,580 --> 00:08:52,089
CLIMAXES IN ONE DAY OF CLOSE
APPROACH AND FLY-BY.

180

00:08:52,089 --> 00:08:55,209
>> WE'RE ROUNDING THIRD BASE,
AND WE'RE HEADED HOME.

181

00:08:55,209 --> 00:08:59,460
>> THE DREAM, THE ADVENTURE, THE
PROMPTS OF DISCOVERY.

182

00:08:59,460 --> 00:09:05,179
THAT'S WHAT MAKES 2015 THE YEAR
OF PLUTO.

183

00:09:05,179 --> 00:09:08,250
>> ALL RIGHT.

184

00:09:08,250 --> 00:09:09,910
SOME OF THOSE FACES THAT YOU SEE
ARE GOING TO SEEM REALLY

185

00:09:09,910 --> 00:09:12,050
FAMILIAR BECAUSE WE'RE GOING TO
HEAR FROM THEM NOW.

186

00:09:12,050 --> 00:09:15,621
UP FIRST TO TALK A LITTLE BIT
ABOUT NASA'S PLANETARY SCIENCE

187

00:09:15,621 --> 00:09:19,300

AND HOW THIS MISSION NEW
HORIZONS HITS INTO THAT IS DR.

188

00:09:19,300 --> 00:09:21,040

JIM GREEN FROM NASA
HEADQUARTERS.

189

00:09:21,040 --> 00:09:22,040

JIM?

190

00:09:22,040 --> 00:09:24,930

>> THANK YOU VERY MUCH, JASON.

191

00:09:24,930 --> 00:09:28,100

SO THIS IS AN EXCITING TIME,
OBVIOUSLY.

192

00:09:28,100 --> 00:09:31,410

PLUTO WAS A BEAUTIFUL PLANET.

193

00:09:31,410 --> 00:09:33,490

WHAT WE CALL, WE DON'T CARE,
DWARF PLANET.

194

00:09:33,490 --> 00:09:36,610

IT'S A BODY WORTH INVESTIGATING.

195

00:09:36,610 --> 00:09:41,160

IT IS THE ARCHETYPE OF A
BRAND-NEW SET OF OBJECTS.

196

00:09:41,160 --> 00:09:46,360

IMAGINE IN YOUR LIFETIME WE HAVE
DISCOVERED A WHOLE NEW REGION TO

197

00:09:46,360 --> 00:09:49,980

EXPLORE IN OUR SOLAR SYSTEM,
THAT THIRD ZONE.

198

00:09:49,980 --> 00:09:53,779
WHAT DO WE MEAN WHEN WE TALK
ABOUT IT AS THE THIRD ZONE?

199
00:09:53,779 --> 00:09:55,399
TERRESTRIAL PLANET?

200
00:09:55,399 --> 00:09:57,800
MERCURY, VENUS, EARTH, MARS.

201
00:09:57,800 --> 00:09:59,860
AND EVEN THE ASTEROID BELT.

202
00:09:59,860 --> 00:10:02,920
THAT'S AN AREA WHERE THERE ARE
MATERIAL TRYING TO BECOME A

203
00:10:02,920 --> 00:10:05,450
PLANET BUT JUPITER WOULDN'T LET
IT.

204
00:10:05,450 --> 00:10:07,050
GRAVITY KEPT PULLING THEM APART.

205
00:10:07,050 --> 00:10:09,850
AND THEN THE SECOND ZONE, THE
GAS GIANTS.

206
00:10:09,850 --> 00:10:12,630
JUPITER, SATURN, URANUS, AND
NEPTUNE.

207
00:10:12,630 --> 00:10:21,560
AND NOW PLUTO IS PART OF MAYBE
10,000, 20,000, 30,000 OBJECTS

208
00:10:21,560 --> 00:10:22,690
JUST LIKE IT.

209

00:10:22,690 --> 00:10:27,449
FOR THE FIRST TIME WE'RE GOING
TO FLY BY PLUTO AND GET A GOOD

210
00:10:27,449 --> 00:10:28,449
LOOK.

211
00:10:28,449 --> 00:10:32,660
NOW, I'M OFTEN ASKED, WHY ARE WE
JUST FLYING BY IT?

212
00:10:32,660 --> 00:10:37,649
AS MIKE MENTIONED IT, WHEN HE
TALKED ABOUT MERCURY, WE DID FLY

213
00:10:37,649 --> 00:10:39,520
BY MERCURY ONCE.

214
00:10:39,520 --> 00:10:42,210
THAT'S A RECONNAISSANCE.

215
00:10:42,210 --> 00:10:46,110
ONCE WE SEE WHAT THE BODIES ARE
LIKE AND WE MAKE THE PLANS TO GO

216
00:10:46,110 --> 00:10:48,550
BACK, THEN WE WANT TO ORBIT.

217
00:10:48,550 --> 00:10:51,550
THEN OF COURSE THE NEXT THING IS
ORBITING GIVES US

218
00:10:51,550 --> 00:10:55,490
HIGH-RESOLUTION INFORMATION THAT
GIVES US INFORMATION TO LAND.

219
00:10:55,490 --> 00:10:59,970
AND THEN ROVE AND THEN PERHAPS
RETURN SAMPLES.

220

00:10:59,970 --> 00:11:04,790

WHEN YOU LOOK AT THE MOON, WE
FLEW BY IT, WE ORBITED IT, WE

221

00:11:04,790 --> 00:11:07,420

LANDED, WE ROVED.

222

00:11:07,420 --> 00:11:11,310

OUR CLOSEST OBJECT TO THE EARTH.

223

00:11:11,310 --> 00:11:14,959

WE FLEW BY MARS EARLY ON MORE
THAN 50 YEARS AGO.

224

00:11:14,959 --> 00:11:16,070

WE ORBITED.

225

00:11:16,070 --> 00:11:17,070

MANY ORBITERS.

226

00:11:17,070 --> 00:11:20,980

WE HAVE LANDERS ON THE SURFACE
NOW AND ORBITERS.

227

00:11:20,980 --> 00:11:24,100

AND THE NEXT STEP, OF COURSE, IS
WE WANT TO BE ABLE TO BRING BACK

228

00:11:24,100 --> 00:11:25,410

SAMPLES.

229

00:11:25,410 --> 00:11:27,750

SO PLUTO, HERE WE COME.

230

00:11:27,750 --> 00:11:29,550

THIS IS A FLY-BY MISSION.

231

00:11:29,550 --> 00:11:33,630

A HISTORIC MISSIONMENT WE WANT
TO GET A GOOD LOOK AT IT.

232

00:11:33,630 --> 00:11:37,450
THAT'S GOING TO ENABLE US TO
FIGURE OUT WHAT THOSE NEXT STEPS

233

00:11:37,450 --> 00:11:38,450
ARE.

234

00:11:38,450 --> 00:11:41,350
AND I BELIEVE THIS OBJECT IS
GOING TO BE SO EXCITING WE'RE

235

00:11:41,350 --> 00:11:43,060
GOING TO WANT TO GET BACK.

236

00:11:43,060 --> 00:11:45,699
AND I HOPE WE WILL BE ABLE TO
GET BACK IN OUR LIFETIMES,

237

00:11:45,699 --> 00:11:47,440
PERHAPS ORBITED.

238

00:11:47,440 --> 00:11:50,550
THAT WOULD BE A TRULY
SPECTACULAR MISSION.

239

00:11:50,550 --> 00:11:53,140
BUT RIGHT NOW WE ARE WELL ON OUR
WAY.

240

00:11:53,140 --> 00:11:58,360
AS ALAN MENTIONED EARLIER IN THE
VIDEO, WE ARE MORE THAN THIRD

241

00:11:58,360 --> 00:11:59,360
BASE.

242

00:11:59,360 --> 00:12:03,209
WE ARE MOVING FAST, ON THE WAY
TO HOME.

243
00:12:03,209 --> 00:12:06,670
AND IT'S GOING TO BE A REAL HOME
RUN FOR US.

244
00:12:06,670 --> 00:12:09,970
SO I THINK WITH THAT I HAVE TIME
FOR A FEW MORE QUESTIONS IF YOU

245
00:12:09,970 --> 00:12:10,970
HAVE ANY.

246
00:12:10,970 --> 00:12:12,170
>> ALL RIGHT.

247
00:12:12,170 --> 00:12:15,069
THOSE IN THE ROOM, WAIT FOR A
MICROPHONE.

248
00:12:15,069 --> 00:12:17,670
OTHERWISE, WE'VE GOT QUESTIONS
FROM THE LINE FROM LOWELL.

249
00:12:17,670 --> 00:12:21,070
WE'RE ALSO TAKING YOUR QUESTIONS
USING #ASKNASA IF YOU'RE

250
00:12:21,070 --> 00:12:26,690
FOLLOWING ALONG AT HOME.

251
00:12:26,690 --> 00:12:33,139
>> IF NEW HORIZONS PROVES THAT
THERE'S WATER ON PLUTO OR INSIDE

252
00:12:33,139 --> 00:12:38,449
PLUTO, DOES IT MAKE ANY
DIFFERENCE IN THE STATURE OF

253

00:12:38,449 --> 00:12:39,449

PLUTO?

254

00:12:39,449 --> 00:12:44,339

>> THE STATURE OF POLLUTE TOE IN
MY MIND AS A SCIENTIST IS

255

00:12:44,339 --> 00:12:45,339

ALREADY THERE.

256

00:12:45,339 --> 00:12:50,680

IT IS ALREADY AN OBJECT WELL
WORTH EXAMINING IN GREAT DETAIL.

257

00:12:50,680 --> 00:12:54,529

YOU KNOW, THE MORE WE SEE AND
ANALYZE THE DATA FROM OUR

258

00:12:54,529 --> 00:12:58,370

MISSIONS THE MORE WE REALIZE THE
IMPORTANCE WATER PLAYS NOT ONLY

259

00:12:58,370 --> 00:13:02,209

IN LIFE BUT IN ALL OUR AREAS IN
YOUR SOLAR SYSTEM.

260

00:13:02,209 --> 00:13:07,069

AND I BELIEVE THE KUIPER BELT IS
FULL OF WATER ICE AND FULL OF

261

00:13:07,069 --> 00:13:12,220

OTHER VOLATILES AND PERHAPS
PLAYS A VERY IMPORTANT ROLE IN

262

00:13:12,220 --> 00:13:15,000

FEEDING LIFE HERE ON EARTH.

263

00:13:15,000 --> 00:13:20,209

WE NOW KNOW FROM OUR MODELS THAT
THE PLANETS WHERE THEY ARE NOW,

264

00:13:20,209 --> 00:13:23,660

PARTICULARLY THE GAS GIANTS ARE
NOT IN THE LOCATION WHERE THEY

265

00:13:23,660 --> 00:13:25,660

ORIGINALLY FORMED.

266

00:13:25,660 --> 00:13:29,670

AND JUPITER'S GRAVITY PUSHED
THEM AROUND VERY EARLY ON IN THE

267

00:13:29,670 --> 00:13:30,980

SOLAR SYSTEM.

268

00:13:30,980 --> 00:13:34,009

THAT TOOK THAT KUIPER BELT AREA
AND BROUGHT IT INWARD, BROUGHT

269

00:13:34,009 --> 00:13:38,610

IN THE COMETS, THE ASTEROIDS AND
COUPER BELT OBJECTS AND BROUGHT

270

00:13:38,610 --> 00:13:42,839

IN WATER THAT THEN OF COURSE
HERE ON EARTH IS SO ESSENTIAL

271

00:13:42,839 --> 00:13:44,000

FOR LIFE TO GROW.

272

00:13:44,000 --> 00:13:46,410

WE'RE JUST
BEGINNING TO REALIZE THE

273

00:13:46,410 --> 00:13:48,990

IMPORTANCE OF THE KUIPER BELT
OBJECTS.

274

00:13:48,990 --> 00:13:52,490

AND SO I WOULDN'T BE SURPRISED
IF WE SEE WATER ICE.

275

00:13:52,490 --> 00:13:57,200

I WOULDN'T BE SURPRISED IF WE
SEE FEATURES ON IT THAT TELL US

276

00:13:57,200 --> 00:14:00,589

A LOT ABOUT HOW THESE OBJECTS
GET TOGETHER.

277

00:14:00,589 --> 00:14:03,209

AND THAT'S GOING TO BE CRITICAL
FOR OUR UNDERSTANDING OF THE

278

00:14:03,209 --> 00:14:05,790

ORIGIN AND EVOLUTION OF OUR
SOLAR SYSTEM.

279

00:14:05,790 --> 00:14:06,839

>> WONDERFUL.

280

00:14:06,839 --> 00:14:08,629

OUR NEXT QUESTION COMES FROM
LOWELL OBSERVATORY.

281

00:14:08,629 --> 00:14:09,629

>> HI.

282

00:14:09,629 --> 00:14:13,339

MY NAME IS CARMEN AUSTIN, NASA
SOCIAL LOWELL OBSERVATORY.

283

00:14:13,339 --> 00:14:15,450

I HAVE A QUESTION ABOUT THE
SPEED OF THE NEW HORIZONS

284

00:14:15,450 --> 00:14:16,450

SPACECRAFT.

285

00:14:16,450 --> 00:14:17,450

SO I KNOW IT'S BEEN MENTIONED
TODAY WE LIKE TO SAY NEW

286

00:14:17,450 --> 00:14:18,450

HORIZONS WAS THE FASTEST
SPACECRAFT EVER LAUNCHED.

287

00:14:18,450 --> 00:14:26,660

AND THAT SOUNDS AWESOME.

288

00:14:26,660 --> 00:14:46,023

BUT I HEARD THE HELIO 2 PRO IS
THE FASTEST MAN MADE SPACECRAFT

289

00:14:46,023 --> 00:14:47,023

OR VEHICLE OF ANY KIND EVER.

290

00:14:47,023 --> 00:14:48,023

SO WHICH IS REALLY THE FASTEST
AND WHY DO WE SAY THAT BOTH ARE

291

00:14:48,023 --> 00:14:49,023

THE FASTEST?

292

00:14:49,023 --> 00:14:50,023

WHAT'S THE DIFFERENCE?

293

00:14:50,023 --> 00:14:51,023

>> WELL, INDEED, THE LITTLE
VIDEO TOLD US WE STRIPPED DOWN

294

00:14:51,023 --> 00:14:52,023

THE ATLAS.

295

00:14:52,023 --> 00:14:54,569

WE GOT AS MUCH POWER OUT OF IT

AS WE POSSIBLY COULD.

296

00:14:54,569 --> 00:14:58,249

AND ON LAUNCH IT INDEED WAS THE
FASTEST SPACECRAFT.

297

00:14:58,249 --> 00:15:01,949

BUT THESE SPACECRAFT MOVE
THROUGH OUR SOLAR SYSTEM TO GET

298

00:15:01,949 --> 00:15:05,839

WHERE THEY NEED TO GO, THERE'S
ALL SORTS OF GRAVITY, ALL SORTS

299

00:15:05,839 --> 00:15:09,980

OF THING WE HAVE TO DO TO CHANGE
THEIR SPEED, CHANGE THEIR

300

00:15:09,980 --> 00:15:13,629

DIRECTION, TO BE ABLE TO GET TO
THEIR LOCATION.

301

00:15:13,629 --> 00:15:18,320

INDEED, HELIOS 1 AND 2 HAVE VERY
MUCH SPACECRAFT.

302

00:15:18,320 --> 00:15:19,819

THEY ARE NO LONGER IN EXISTENCE.

303

00:15:19,819 --> 00:15:21,610

THEY NO LONGER HAVE ANY DATA.

304

00:15:21,610 --> 00:15:25,250

THEY GO BACK AND HAVE BEEN DEAD
FOR PROBABLY 20 YEARS.

305

00:15:25,250 --> 00:15:27,999

SO WE NEED TO KEEP LOOKING
AHEAD.

306

00:15:27,999 --> 00:15:31,870

INDEED, NEW HORIZONS IS
CURRENTLY THE FASTEST SPACECRAFT

307

00:15:31,870 --> 00:15:35,169

IN OUR CURRENT OPERATING FLEET,
BAR NONE.

308

00:15:35,169 --> 00:15:37,799

>> THANK YOU VERY MUCH.

309

00:15:37,799 --> 00:15:39,120

>> ALL RIGHT.

310

00:15:39,120 --> 00:15:41,620

NEXT QUESTION FROM IN THE ROOM
HERE.

311

00:15:41,620 --> 00:15:47,449

OTHER QUESTIONS?

312

00:15:47,449 --> 00:15:51,689

>> WHAT WAS THE TIME FRAME,
WHAT'S THE ALCOHOL SCALE FROM

313

00:15:51,689 --> 00:15:53,930

DREAM TO GETTING THERE?

314

00:15:53,930 --> 00:15:55,680

>> SO IT TOOK MANY, MANY YEARS.

315

00:15:55,680 --> 00:15:58,249

I WASN'T INVOLVED IN THE EARLY
PART OF IT.

316

00:15:58,249 --> 00:15:59,740

BUT ALAN WAS.

317

00:15:59,740 --> 00:16:02,290
SO PLEASE HOLD THAT QUESTION FOR
ALAN, BECAUSE I'M SURE HE'LL

318
00:16:02,290 --> 00:16:06,180
TELL YOU HOW HARD IT WAS TO GO
THROUGH THE PROCESS OF FINALLY

319
00:16:06,180 --> 00:16:08,389
GETTING THIS MISSION ON THE
BOOKS.

320
00:16:08,389 --> 00:16:12,749
BUT I WILL TELL YOU THAT EACH
AND EVERY ONE OF OUR MISSIONS DO

321
00:16:12,749 --> 00:16:17,470
INDEED TAKE A LONG TIME TO
MATURE THE CONCEPT, TO GET IT

322
00:16:17,470 --> 00:16:21,410
JUST RIGHT AND MAKE IT
COMPETITIVE SO THAT NASA THEN

323
00:16:21,410 --> 00:16:23,290
SELECTS THAT BEST IDEA.

324
00:16:23,290 --> 00:16:26,499
THIS IS REALLY A TOUGH BUSINESS
FROM THAT PERSPECTIVE.

325
00:16:26,499 --> 00:16:30,399
BUT WHEN WE DO MAKE A SELECTION,
YOU CAN BE GUARANTEED THAT THESE

326
00:16:30,399 --> 00:16:34,660
ARE THE TOP MISSIONS THAT HUMANS
HAVE EVER PUT TOGETHER IN THESE

327
00:16:34,660 --> 00:16:35,660

AREAS.

328

00:16:35,660 --> 00:16:38,050

AND NEW HORIZONS IS CERTAINLY IN
THAT CATEGORY.

329

00:16:38,050 --> 00:16:39,629

>> ALL RIGHT.

330

00:16:39,629 --> 00:16:40,740

ANOTHER QUESTION FROM LOWELL.

331

00:16:40,740 --> 00:16:41,740

>> HI.

332

00:16:41,740 --> 00:16:42,740

GOOD AFTERNOON.

333

00:16:42,740 --> 00:16:45,250

THIS IS MICHAEL KAISER FROM THE
NASA SOCIAL AT LOWELL.

334

00:16:45,250 --> 00:16:49,420

SO MY QUESTION HAS TO DO WITH
THE SPECK TRAFFIC MY INSTRUMENTS

335

00:16:49,420 --> 00:16:50,420

ON NASA.

336

00:16:50,420 --> 00:16:57,459

CAN WE DETERMINE THE CHEMICAL
MAKEUP OF PLUTO'S CHEMICAL

337

00:16:57,459 --> 00:16:58,459

MAKEUP?

338

00:16:58,459 --> 00:17:02,230

>> THAT'S ANOTHER GREAT QUESTION
FOR ALAN.

339

00:17:02,230 --> 00:17:04,490

I DON'T WANT TO TAKE ANY OF
THESE QUESTIONS AWAY FROM HIM

340

00:17:04,490 --> 00:17:08,520

BECAUSE HE'S REALLY GOT THE
DETAILS ON ALL THE INSTRUMENTS.

341

00:17:08,520 --> 00:17:10,480

SO LET'S SAVE THAT ONE FOR HIM.

342

00:17:10,480 --> 00:17:11,880

>> ALL RIGHT.

343

00:17:11,880 --> 00:17:14,420

OTHER QUESTIONS IN THE ROOM?

344

00:17:14,420 --> 00:17:16,209

>> HELLO, DR.

345

00:17:16,209 --> 00:17:17,209

GREEN.

346

00:17:17,209 --> 00:17:24,410

YOU TOUCHED A LITTLE BIT ON IT
YESTERDAY AT THE SMITHSONIAN,

347

00:17:24,410 --> 00:17:29,990

BUT I KNOW THE MISSION IS 200
WATTS DUE TO THE PELLETS.

348

00:17:29,990 --> 00:17:33,990

HOW HOW LONG COULD THE MISSION
GO ON FOR?

349

00:17:33,990 --> 00:17:38,890

LIKE IT HAS BEEN GONE ON WELL
OVER 25 PLUS YEARS?

350

00:17:38,890 --> 00:17:40,790

>> SO WHAT MAKES A MISSION LAST?

351

00:17:40,790 --> 00:17:42,410

IT HAS TO HAVE POWER.

352

00:17:42,410 --> 00:17:45,420

NEW HORIZONS BRINGS ITS OWN
POWER WITH IT.

353

00:17:45,420 --> 00:17:51,050

HOW IT DOES THAT IS THIS ELEMENT
RIGHT HERE ON THE BACK OF THE

354

00:17:51,050 --> 00:17:55,200

SPACECRAFT IS RADIO ISOTOPE
THERMAL GENERATOR.

355

00:17:55,200 --> 00:18:00,420

AND YOU SAY USES THE PLUTONIUM
238 INTO AVA RIGHT OF PRODUCTS,

356

00:18:00,420 --> 00:18:02,960

ONE OF WHICH IS HUMAN YUM.

357

00:18:02,960 --> 00:18:06,240

IT IS STRIPPED OFF ALL ITS
ELECTRONS.

358

00:18:06,240 --> 00:18:08,720

IT GIVES A PUNCH.

359

00:18:08,720 --> 00:18:11,140

THAT CAN HEAT THINGS UP.

360

00:18:11,140 --> 00:18:15,950

WE TAKE THE HEAT FROM THE DECAY
OF PLUTONIUM AND WE TURN THAT

361

00:18:15,950 --> 00:18:20,000

INTO ELECTRICITY BY CHARGING UP
BATTERIES AND USING THE

362

00:18:20,000 --> 00:18:21,000

BATTERIES.

363

00:18:21,000 --> 00:18:26,440

SO AS LONG AS IT TAKES ITS OWN
POWER, IT'S GOING TO DO GREAT.

364

00:18:26,440 --> 00:18:30,100

SO JUST LIKE THE VOYAGERS, WHO
ALSO HAVE RADIO ISOTOPE POWER

365

00:18:30,100 --> 00:18:33,900

SYSTEMS ON THEM, THEY DECAY OVER
TIME.

366

00:18:33,900 --> 00:18:37,420

RIGHT NOW THE VOYAGERS ARE
WORKING ON A MATTER OF 10 WATTS

367

00:18:37,420 --> 00:18:38,730

OR SO.

368

00:18:38,730 --> 00:18:43,100

IT'S GOING TO TAKE SEVERAL
DECADES BEFORE NEW HORIZONS WILL

369

00:18:43,100 --> 00:18:46,360

GET DOWN TO THE FEW WATTS AREA.

370

00:18:46,360 --> 00:18:50,000

SO AS LONG AS THE SPACECRAFT IS
HEALTHY, SO LONG ITS INSTRUMENTS

371

00:18:50,000 --> 00:18:55,510

CAN WORK WITH THE POWER THAT'S
AVAILABLE, IT HAS THE POTENTIAL

372

00:18:55,510 --> 00:18:57,630
TO CONTINUE TO OPERATE.

373

00:18:57,630 --> 00:18:59,020
>> THANKS.

374

00:18:59,020 --> 00:19:00,020
>> YOU BET.

375

00:19:00,020 --> 00:19:01,020
>> ALL RIGHT.

376

00:19:01,020 --> 00:19:02,020
OUR NEXT QUESTION COMES FROM
LOWELL.

377

00:19:02,020 --> 00:19:03,020
>> THIS IS PAULINE AT THE NASA
SOCIAL LOWELL OBSERVATORY.

378

00:19:03,020 --> 00:19:14,740
-- OR DO YOU THINK THERE'S A
CHANCE THAT AN APPROACH WE WILL

379

00:19:14,740 --> 00:19:19,059
HAVE NEW IDEAS ALTOGETHER?

380

00:19:19,059 --> 00:19:24,020
>> WELL, YOU KNOW, FROM A NASA
PERSPECTIVE, AS I MENTIONED

381

00:19:24,020 --> 00:19:29,140
EARLY ON, WE DON'T CARE WHAT WE
CALL IT, PLANET, DWARF PLANET.

382

00:19:29,140 --> 00:19:32,320

BUT I HAVE TO TELL YOU THIS IS A
FASCINATING BODY.

383

00:19:32,320 --> 00:19:35,690

I'VE NEVER SEEN ANYTHING LIKE IT
IN THE SOLAR SYSTEM.

384

00:19:35,690 --> 00:19:38,880

YOU KNOW, PLUTO AND CHARON ARE
PRETTY MASSIVE.

385

00:19:38,880 --> 00:19:41,870

THEY DO THIS DANCE AROUND THE
CENTER OF GRAVITY.

386

00:19:41,870 --> 00:19:44,800

THE CENTER OF GRAVITY BETWEEN
THE EARTH AND OUR MOON IS WELL

387

00:19:44,800 --> 00:19:45,910

INSIDE OUR EARTH.

388

00:19:45,910 --> 00:19:49,340

AND IT LOOKS LIKE THE MOON
CONSTANTLY GOES AROUND THE

389

00:19:49,340 --> 00:19:50,340

EARTH.

390

00:19:50,340 --> 00:19:52,990

BUT THAT'S NOT WHAT THIS SYSTEM
IS ALL ABOUT AT ALL.

391

00:19:52,990 --> 00:19:56,840

IT LOOKS MORE LIKE BINARY STARS
WHERE YOU HAVE TWO COMPARABLE

392

00:19:56,840 --> 00:20:00,580

OBJECTS FIGHTING IT OUT.

393

00:20:00,580 --> 00:20:06,400

AND THE MOONS, THE MOONS ARE
SOMETIMES CHAOTICALLY BUFFERED

394

00:20:06,400 --> 00:20:10,260

AROUND AND ALSO QUITE
FASCINATING.

395

00:20:10,260 --> 00:20:14,020

SO THIS SYSTEM IS NOTHING LIKE
ANYTHING WE HAVE EVER SEEN.

396

00:20:14,020 --> 00:20:18,590

WHEN THAT HAPPENS, YOU ALWAYS
WANT TO RETHINK WHAT YOU KNOW

397

00:20:18,590 --> 00:20:20,940

AND WHAT YOU'VE LEARNED.

398

00:20:20,940 --> 00:20:24,460

AND THEN YOU CAN MOVE FORWARD
WITH NEW AND DIFFERENT IDEAS.

399

00:20:24,460 --> 00:20:26,770

SO LET'S SEE WHAT HAPPENS NEXT.

400

00:20:26,770 --> 00:20:28,830

>> ALL RIGHT.

401

00:20:28,830 --> 00:20:31,930

ONE MORE QUESTION IN THE ROOM
HERE.

402

00:20:31,930 --> 00:20:39,200

>> HEY, SO WITH WHAT YOU JUST
SAID ABOUT THE CENTER OF GRAVITY

403

00:20:39,200 --> 00:20:42,590

BETWEEN PLUTO AND THE MOON, THAT

WOULD INFER THERE'S SOME SORT OF

404

00:20:42,590 --> 00:20:47,320

STABLE ORBITS LIKE A LE GRUNGE
POINT KIND OF THING.

405

00:20:47,320 --> 00:20:49,760

WOULD NEW HORIZONS BE ABLE TO
LOOK INTO WHAT'S HAPPENING THERE

406

00:20:49,760 --> 00:20:50,890

AS WELL.

407

00:20:50,890 --> 00:20:51,890

>> ABSOLUTELY.

408

00:20:51,890 --> 00:20:55,620

NEW HORIZONS, AS IT MAKES ITS
WAY TOWARDS PLUTO IS CONSTANTLY

409

00:20:55,620 --> 00:20:57,450

SCANNING THAT WHOLE AREA.

410

00:20:57,450 --> 00:21:02,260

WE'RE ACTUALLY VERY LUCKY THAT
THE ROTATIONAL AXIS OF PLUTO IS

411

00:21:02,260 --> 00:21:07,160

LYING DOWN MORE LIKE THE PLANE
OF THE PLANETS, OKAY.

412

00:21:07,160 --> 00:21:10,440

AND THEN THAT MEANS ITS MOONS
ARE DISPLAYED RIGHT IN FRONT OF

413

00:21:10,440 --> 00:21:11,560

US.

414

00:21:11,560 --> 00:21:15,281

SO WE'RE ABLE TO THEN SEE THEIR
POSITIONS BETTER, UNDERSTAND

415

00:21:15,281 --> 00:21:20,090
THEIR MASSES, UNDERSTAND THEIR
RELATIONSHIP BETWEEN EACH OTHER,

416

00:21:20,090 --> 00:21:22,670
GET AN IDEA OF HOW THE
GRAVITATIONAL RESONANCES ARE

417

00:21:22,670 --> 00:21:26,440
ALLOWING THE MOONS TO EXIST IN
THESE LOCATIONS AND NOT IN

418

00:21:26,440 --> 00:21:27,440
OTHERS.

419

00:21:27,440 --> 00:21:29,770
SO ALL THAT SCIENCE IS GOING TO
BE DONE AS WE TAKE THIS

420

00:21:29,770 --> 00:21:31,840
FLY-THROUGH AND GET THE DATA.

421

00:21:31,840 --> 00:21:33,470
>> ALL RIGHT.

422

00:21:33,470 --> 00:21:35,161
ONE MORE QUESTION FROM LOWELL.

423

00:21:35,161 --> 00:21:38,350
>> AND LOWELL DOESN'T HAVE
ANYMORE QUESTIONS.

424

00:21:38,350 --> 00:21:39,740
THANK YOU.

425

00:21:39,740 --> 00:21:40,920

>> ALL RIGHT, THEN.

426

00:21:40,920 --> 00:21:42,450

LET'S GIVE A ROUND OF APPLAUSE
FOR JIM.

427

00:21:42,450 --> 00:21:43,670

THANK YOU VERY MUCH.

428

00:21:43,670 --> 00:21:47,120

THANK YOU FOR JOINING US TODAY.

429

00:21:47,120 --> 00:21:48,270

>> MY PLEASURE.

430

00:21:48,270 --> 00:21:51,310

>> UP NEXT THE PRINCIPAL
INVESTIGATOR FOR THE NEW

431

00:21:51,310 --> 00:21:52,650

HORIZONS MISSION, DR.

432

00:21:52,650 --> 00:21:54,360

ALAN STERN
FROM THE SOUTHWEST RESEARCH

433

00:21:54,360 --> 00:21:55,480

INSTITUTE.

434

00:21:55,480 --> 00:21:56,610

ALAN?

435

00:21:56,610 --> 00:21:58,870

>> HEY, EVERYBODY.

436

00:21:58,870 --> 00:22:01,130

GOOD AFTERNOON.

437

00:22:01,130 --> 00:22:02,220
IS THE MIKE LIVE?

438
00:22:02,220 --> 00:22:03,680
CAN YOU HEAR IT?

439
00:22:03,680 --> 00:22:04,680
GREAT.

440
00:22:04,680 --> 00:22:06,020
WELL, I'M EXCITED TO TELL YOU
ABOUT NEW HORIZONS.

441
00:22:06,020 --> 00:22:09,010
AND I APPRECIATE JIM SORT OF
PUTTING IT ALL IN CONTEXT WITHIN

442
00:22:09,010 --> 00:22:11,740
THE NASA PLANETARY EXPLORATION
PROGRAM.

443
00:22:11,740 --> 00:22:14,530
IF WE CAN HAVE THE FIRST TIME
STEP.

444
00:22:14,530 --> 00:22:19,070
GO AHEAD AND PUT THE FIRST SLIDE
UP, DAVID.

445
00:22:19,070 --> 00:22:21,960
THIS IS A CARTOON VIEW.

446
00:22:21,960 --> 00:22:25,410
IT STARTS WAY DOWN BY THE SUN.

447
00:22:25,410 --> 00:22:30,040
EACH OF THOSE WHITE ARE THE
MIDDLE SOLAR SYSTEM.

448

00:22:30,040 --> 00:22:33,830
YOU CAN'T EVEN SEE THE ORBITS OF
THE EARTH AND MARS, MERCURY, AND

449
00:22:33,830 --> 00:22:35,410
VENUS ON THIS SCALE.

450
00:22:35,410 --> 00:22:37,580
THIS IS REALLY AN EPIC JOURNEY.

451
00:22:37,580 --> 00:22:40,460
ALL THE WAY ACROSS OUR SOLAR
SYSTEM TO THE VERY FRONTIER OF

452
00:22:40,460 --> 00:22:41,460
HUMAN KNOWLEDGE.

453
00:22:41,460 --> 00:22:44,280
AND TO THE VERY FRONTIER OF
EXPLORATION.

454
00:22:44,280 --> 00:22:46,081
WE'RE FOLLOWING IN THE FOOTSTEPS
OF GIANTS.

455
00:22:46,081 --> 00:22:51,800
GIANTS NAMED MARINER, FIRST TO
MARS AND FIRST TO VENUS.

456
00:22:51,800 --> 00:22:52,830
FIRST TO MERCURY.

457
00:22:52,830 --> 00:22:55,630
GIANTS LIKE PIONEER, FIRST TO
JUPITER AND SATURN.

458
00:22:55,630 --> 00:22:59,690
AND OF COURSE THE STORIED
MISSION VOYAGER, FIRST TO URANUS

459

00:22:59,690 --> 00:23:02,010

AND FIRST TO NEPTUNE.

460

00:23:02,010 --> 00:23:03,980

AND DAWN, FIRST TO SERIES.

461

00:23:03,980 --> 00:23:05,970

THESE ARE THE PLANETS OF OUR
SOLAR SYSTEM.

462

00:23:05,970 --> 00:23:09,140

THESE ARE THE MISSIONS AND THE
MISSION TEAMS THAT HAVE FOR ALL

463

00:23:09,140 --> 00:23:12,580

OF HISTORY OPENED THEM UP FROM
WHAT CARL SAGAN CALLED POINTS OF

464

00:23:12,580 --> 00:23:17,450

LIGHT INTO TRUE PLANETS WHERE WE
CAN WRITE THE TEXTBOOKS AND

465

00:23:17,450 --> 00:23:20,890

UNDERSTAND WHAT THEY'RE ABOUT,
OUR LARGER SURROUNDINGS BEYOND

466

00:23:20,890 --> 00:23:23,480

THE EARTH, OUR HOME SOLAR
SYSTEM.

467

00:23:23,480 --> 00:23:28,540

NEW HORIZONS HAS FLOWN SINCE
2006 AT RECORD SPEED CROSSING

468

00:23:28,540 --> 00:23:32,580

THE OR BITS OF MARS, JUPITER,
SATURN, URANUS AND NEPTUNE, IN

469

00:23:32,580 --> 00:23:37,900

EACH CASE SETTING A RECORD TO
THAT PLANET'S ORBIT ON SHORT

470

00:23:37,900 --> 00:23:44,340
COURSE TO INTERCEPT PLUTO IN
JULY, JULY 14th, BASTILLE DAY,

471

00:23:44,340 --> 00:23:45,380
2015.

472

00:23:45,380 --> 00:23:48,180
YOU SEE THE THIRD ZONE OF THE
SOLAR SYSTEM DEPICTED HERE.

473

00:23:48,180 --> 00:23:52,090
KUIPER BELT IS THE LARGEST
STRUCTURE AND IT WASN'T EVEN

474

00:23:52,090 --> 00:23:54,440
DISCOVERED UNTIL THE 1990s.

475

00:23:54,440 --> 00:23:59,320
NEW HORIZONS IS THE FIRST
EXPLORATION OF THAT REGION.

476

00:23:59,320 --> 00:24:01,580
PRIMARY TARGET IS THE PLUTO
SYSTEM.

477

00:24:01,580 --> 00:24:05,330
PLUTO IS THE LARGEST, THE
BRIGHTEST, THE FIRST DISCOVERED,

478

00:24:05,330 --> 00:24:08,750
AND THE MOST COMPLEX TO OUR
KNOWLEDGE OF ANY OBJECT IN THE

479

00:24:08,750 --> 00:24:09,950
KUIPER BELT.

480

00:24:09,950 --> 00:24:11,770

IT HAS FIVE SATELLITES.

481

00:24:11,770 --> 00:24:13,440

IT HAS AN ATMOSPHERE.

482

00:24:13,440 --> 00:24:16,150

IT HAS A MOON THE SIZE OF TEXAS
ORBITING SO CLOSE THEY

483

00:24:16,150 --> 00:24:17,930

CONSTITUTE A BINARY.

484

00:24:17,930 --> 00:24:20,940

FOUR SMALLER MOONS AND MORE TO
BE DISCOVERED.

485

00:24:20,940 --> 00:24:22,250

AND MAYBE EVEN RINGS.

486

00:24:22,250 --> 00:24:26,280

IT IS MADE OF ROCK ON THE
INSIDE, BUT IT WEARS AN OUTER

487

00:24:26,280 --> 00:24:36,090

SHELL OF ICE, AND EXOTIC ICE,
CARBON MONOXIDE.

488

00:24:36,090 --> 00:24:41,050

IT HAS WINDS, SEASONS,
PRECIPITATION IN THE FORM OF

489

00:24:41,050 --> 00:24:42,810

SNOWS ONTO THE SURFACE.

490

00:24:42,810 --> 00:24:46,490

WE EVEN SEE THIS ATMOSPHERE HAS
DOUBLED IN PRESSURE SINCE WE

491
00:24:46,490 --> 00:24:47,870
HAVE BEEN OBSERVING IT.

492
00:24:47,870 --> 00:24:51,880
WE SEE THE SNOWS HAVE CHANGED
THE SURFACE APPEARANCE OF PLUTO.

493
00:24:51,880 --> 00:24:55,580
WE KNOW IT'S A COMPLEX WORLD.

494
00:24:55,580 --> 00:24:57,160
BUT IT'S NOT ALONE.

495
00:24:57,160 --> 00:24:59,320
AND I'M GOING TO BE TELLING YOU
ABOUT THE KUIPER BELT IN JUST A

496
00:24:59,320 --> 00:25:00,320
BIT.

497
00:25:00,320 --> 00:25:02,820
FIRST I WANT TO TELL YOU ABOUT
SOME OF THE FIRSTS THAT NEW

498
00:25:02,820 --> 00:25:04,410
HORIZONS IS GOING TO BE MAKING.

499
00:25:04,410 --> 00:25:08,050
WE ARE THE FIRST MISSION TO THE
KUIPER BELT, THE FIRST TO

500
00:25:08,050 --> 00:25:09,050
EXPLORE THE PLUTO SYSTEM.

501
00:25:09,050 --> 00:25:13,270
BUT AS YOU SEE, WE ARE THE FIRST
IN NASA'S NEW FRONTIER PLANETARY

502

00:25:13,270 --> 00:25:14,960
EXPLORATION PROGRAM.

503
00:25:14,960 --> 00:25:18,030
THIS IS ACTUALLY THE FIRST
MISSION TO AN OUTER PLANET LED

504
00:25:18,030 --> 00:25:21,160
BY AN INDIVIDUAL PRINCIPAL
INVESTIGATOR AND TEAM.

505
00:25:21,160 --> 00:25:23,220
AND THERE ARE MORE FIRSTS THERE
AS WELL.

506
00:25:23,220 --> 00:25:24,250
YOU CAN READ THEM.

507
00:25:24,250 --> 00:25:28,690
BUT I WANT TO TELL YOU ABOUT A
LACK THAT I'M VERY PROUD OF.

508
00:25:28,690 --> 00:25:31,420
THAT IS 245 WE ARE COMPLETING
THE RECONNAISSANCE OF THE SOLAR

509
00:25:31,420 --> 00:25:35,490
SYSTEM.

510
00:25:35,490 --> 00:25:39,420
THEY ARE FLYING ANCHOR LEG IN A
RELAY THAT BEGAN IN THE 1960s IN

511
00:25:39,420 --> 00:25:43,690
WHICH NASA HAS BEEN FIRST TO
EVERY PLANET AND OPENED OUR EYES

512
00:25:43,690 --> 00:25:47,540
TO THE TRUE DIVERSITY OF
PLANETARY TYPES, FROM

513

00:25:47,540 --> 00:25:53,160

MIDDLE-SIZED TERRESTRIAL TO THE
GARGANTUAN OF THE GAS GIANT

514

00:25:53,160 --> 00:25:56,320

REGION, TO THE KUIPER BELT.

515

00:25:56,320 --> 00:26:00,420

IN FACT, SMALL PLANETS ARE
REPRESENTED RIGHT HERE.

516

00:26:00,420 --> 00:26:02,660

THESE ARE ACTUAL WORLDS IN THE
KUIPER BELT.

517

00:26:02,660 --> 00:26:10,270

THE LARGEST MEMBERS OF THE
KUIPER BELT, PLUTO.

518

00:26:10,270 --> 00:26:13,210

YOU CAN SEE, THESE ARE
REPRESENTED TO THEIR RELATIVE

519

00:26:13,210 --> 00:26:17,000

SIZE WITH THEIR SATELLITES WHEN
THEY ARE KNOWN.

520

00:26:17,000 --> 00:26:18,380

THEIR TRUE COLORS AND
REFLECTIVITY.

521

00:26:18,380 --> 00:26:22,740

THE THING I WANT YOU TO NOTICE
IS THE DIVERSITY OF THESE

522

00:26:22,740 --> 00:26:24,810

PLANETS IN THE KUIPER BELT.

523

00:26:24,810 --> 00:26:26,870
IT'S SOMETHING WE DON'T
UNDERSTAND.

524
00:26:26,870 --> 00:26:30,130
WE DON'T KNOW WHY THEY SHOULD BE
SUCH A GREAT VARIETY.

525
00:26:30,130 --> 00:26:33,730
YOU MIGHT THINK ALL BEING FORMED
SO FAR AWAY WHEN IT'S COLD THEY

526
00:26:33,730 --> 00:26:34,790
WOULD BE SIMILAR.

527
00:26:34,790 --> 00:26:36,480
IT'S A MYSTERY.

528
00:26:36,480 --> 00:26:39,950
WITH NEW HORIZONS WE'RE GOING TO
BE ABLE TO EXPLORE THE FIRST IN

529
00:26:39,950 --> 00:26:43,020
DEPTH AND WE WILL DO IT IN LESS
THAN SIX WEEKS.

530
00:26:43,020 --> 00:26:45,110
IF I COULD HAVE THE NEXT TIME
STAMP.

531
00:26:45,110 --> 00:26:48,350
THIS IS THE SPACECRAFT THAT WILL
MAKE THAT EXPLORATION.

532
00:26:48,350 --> 00:26:51,430
NEW HORIZONS IS ONLY THE SIZE OF
A BABY GRAND PIANO.

533
00:26:51,430 --> 00:26:55,680
A LOT LAUNCH AT FULL FUEL

SUPPLY, IT WEIGHED ABOUT 1,000

534

00:26:55,680 --> 00:26:56,680
POUNDS.

535

00:26:56,680 --> 00:27:01,780
INSIDE THAT SPACECRAFT, WHICH IS
DRAWN ON THE LEFT AND SHOWN IN A

536

00:27:01,780 --> 00:27:04,850
PICTURE TAKEN DOWN AT THE CAPE
BEFORE LAUNCH ON THE RIGHT,

537

00:27:04,850 --> 00:27:07,870
INSIDE THAT SPACECRAFT ARE ALL
THE SYSTEMS THAT ARE NEEDED FOR

538

00:27:07,870 --> 00:27:09,640
THE JOURNEY.

539

00:27:09,640 --> 00:27:14,280
PROPULSION, GUIDANCE, DATA AND
COMMAND HANDLING,

540

00:27:14,280 --> 00:27:15,280
COMMUNICATIONS.

541

00:27:15,280 --> 00:27:20,690
ON THE OUTSIDE ARE 9 SEVEN
SCIENTIST INSTRUMENTS, RADIO

542

00:27:20,690 --> 00:27:24,130
SCIENCE, CAMERAS, STUDENT DUST
COUNTER TO BE USED TO EXPLORE

543

00:27:24,130 --> 00:27:25,340
THE SYSTEM.

544

00:27:25,340 --> 00:27:28,100

THE SEVEN INSTRUMENTS ABOARD NEW
HORIZONS ARE SOMETHING REALLY

545

00:27:28,100 --> 00:27:33,260

NOTABLE BECAUSE THEY WERE HIGHLY
MINIATURIZED TO FIT ON A SMALL

546

00:27:33,260 --> 00:27:35,680

SPACECRAFT SO WE COULD GET A
FAST LAUNCH.

547

00:27:35,680 --> 00:27:39,500

THE SEVEN ON THIS PAY LOAD ARE
THE MOST SOPHISTICATED AND

548

00:27:39,500 --> 00:27:44,220

CAPABLE BATTERY OF INSTRUMENTS
SENT SO A FIRST RECONNAISSANCE

549

00:27:44,220 --> 00:27:48,320

AND YET THEY WEIGH COMBINED LESS
THAN JUST A CAMERA ON THE

550

00:27:48,320 --> 00:27:50,220

ORBITER.

551

00:27:50,220 --> 00:27:55,170

AND ALL SEVEN COULD TURN THEM
ALL ON AT ONCE AND DRAW 28

552

00:27:55,170 --> 00:27:56,170

WATTS.

553

00:27:56,170 --> 00:27:57,830

THAT'S A NIGHT LIGHT.

554

00:27:57,830 --> 00:27:58,880

IT'S AMAZING.

555

00:27:58,880 --> 00:28:02,700
THE POWER OF THESE INSTRUMENTS
IS ORDERS OF MAGNITUDE BEYOND

556
00:28:02,700 --> 00:28:06,240
WHAT WAS AVAILABLE IN OUR
TECHNOLOGY IN THE 1970s TO BUILD

557
00:28:06,240 --> 00:28:07,240
FOR VOYAGER.

558
00:28:07,240 --> 00:28:10,860
WE WILL HAVE DATA SETS THAT WILL
JUST BE MOUTHWATERING.

559
00:28:10,860 --> 00:28:17,560
WE ARE GOING TO HAVE SURFACE
MAPS, COLOR MAPS, COMPOSITION

560
00:28:17,560 --> 00:28:18,560
MAPS.

561
00:28:18,560 --> 00:28:20,330
NOT JUST FOR PLUTO BUT ALSO THE
SATELLITES.

562
00:28:20,330 --> 00:28:23,920
WE WILL SEARCH FOR NEW
SATELLITES AND RINGS, THE

563
00:28:23,920 --> 00:28:28,600
TEMPERATURE AND STRUCTURE OF THE
ATMOSPHERE, SEARCH FOR

564
00:28:28,600 --> 00:28:33,580
IONOSPHERE.

565
00:28:33,580 --> 00:28:36,010
IF I COULD HAVE THE NEXT TIME
STAMP.

566

00:28:36,010 --> 00:28:38,170

WE ALREADY KNOW A LITTLE BIT
ABOUT PLUTO FROM WHAT I'VE TOLD

567

00:28:38,170 --> 00:28:39,250

YOU AND WHAT JIM HAD TO SAY.

568

00:28:39,250 --> 00:28:40,340

IT IS A BINARY.

569

00:28:40,340 --> 00:28:43,560

AND THIS IS OUR FIRST TRIP TO A
BINARY PLANET.

570

00:28:43,560 --> 00:28:52,140

WE ARE LOOKING FORWARD TO
EXPLORING THAT.

571

00:28:52,140 --> 00:28:54,950

AS I SAID, PLUTO HAS AN
ATMOSPHERE, COMPLEX SEASONS AND

572

00:28:54,950 --> 00:28:58,380

MANY ATTRIBUTES, ALL THE
ATTRIBUTES OF THE CLOSER

573

00:28:58,380 --> 00:28:59,380

PLANETS.

574

00:28:59,380 --> 00:29:03,140

AND LARGE MOON CHARON COULD
QUALIFY ITSELF.

575

00:29:03,140 --> 00:29:05,940

IT'S MADE OF ROCK AND ICE.

576

00:29:05,940 --> 00:29:08,530

WE'RE GOING TO SEARCH TO SEE IF

IT HAS ONE.

577

00:29:08,530 --> 00:29:12,110
OR IF IT DRAWS MATERIAL OFF
PLUTO'S ATMOSPHERE IN TO ORBIT

578

00:29:12,110 --> 00:29:14,410
AROUND ITSELF.

579

00:29:14,410 --> 00:29:17,030
WE THINK IT IS PRETTY GOOD
CIRCUMSTANTIAL EVIDENCE THAT

580

00:29:17,030 --> 00:29:21,340
CHARON COULD BE ACTIVE,
GEOLOGICALLY ACTIVE TODAY FROM

581

00:29:21,340 --> 00:29:25,280
SOME OF THE CHEMICAL CLUES WE
HAVE SEEN IN SPECK TRAFFIC MY.

582

00:29:25,280 --> 00:29:32,410
WE WILL LOOK FOR MORE TELL TALES
IN TERMS OF ITS CRATERING

583

00:29:32,410 --> 00:29:41,380
RECORD, FOR EXAMPLE, ITS
GEOLOGY, TEXT NISM, SLURRIES OR

584

00:29:41,380 --> 00:29:42,540
OTHER THINGS.

585

00:29:42,540 --> 00:29:45,990
SOME GEO PHYSICAL MODELS PREDICT
CHARON MAY HAVE AN OCEAN ON ITS

586

00:29:45,990 --> 00:29:46,990
INSIDE.

587

00:29:46,990 --> 00:29:49,850
HOW IS THAT FOR WILD?

588
00:29:49,850 --> 00:29:50,850
NEXT VIEW.

589
00:29:50,850 --> 00:29:53,090
THIS IS ONE OF MY FAVORITE
PICTURES.

590
00:29:53,090 --> 00:29:57,270
IT'S THE BEST PICTURE OF PLUTO
EVER MADE FROM EARTH.

591
00:29:57,270 --> 00:30:00,070
IT'S MADE BY THE BIGGEST,
BADDEST GUN WE HAVE, THE HUBBELL

592
00:30:00,070 --> 00:30:01,610
TELESCOPE.

593
00:30:01,610 --> 00:30:06,100
FROM 3,000 MILES AWAY IT'S NOT
MUCH, BECAUSE PLUTO IS SO FAR

594
00:30:06,100 --> 00:30:07,330
AWAY.

595
00:30:07,330 --> 00:30:10,580
LET ME CONTRAST THAT IF I CAN
GET THE NEXT TIME STEP HERE.

596
00:30:10,580 --> 00:30:15,530
THIS IS THE NEXT IMAGERY WE WILL
HAVE OF PLUTO IN A FEW WEEKS.

597
00:30:15,530 --> 00:30:19,960
THESE ARE IMAGES OF THE EARTH AT
RESOLUTIONS COMPARABLE TO WHAT

598

00:30:19,960 --> 00:30:24,100

NEW HORIZONS WILL DELIVER ON
PLUTO.

599

00:30:24,100 --> 00:30:26,140

THE EARTH NOT HAVE PIXELATED.

600

00:30:26,140 --> 00:30:28,150

A BEAUTIFUL VIEW OF THE EARTH.

601

00:30:28,150 --> 00:30:31,980

THAT'S ABOUT THE WE WILL HAVE
ONE DAY BEFORE WE ARRIVE AT

602

00:30:31,980 --> 00:30:33,400

CLOSEST APPROACH.

603

00:30:33,400 --> 00:30:38,410

OUR IMAGES WILL BE AS GOOD AS
THIS IMAGE OF NEW YORK CITY.

604

00:30:38,410 --> 00:30:40,650

I REALIZE ON THE TELEVISION
CAMERA YOU MAY NOT BE ABLE TO

605

00:30:40,650 --> 00:30:42,980

SEE EVERYTHING WE CAN SEE IN THE
ROOM.

606

00:30:42,980 --> 00:30:46,540

BUT THAT'S MANHATTAN ISLAND IN
THE MIDDLE WITH THE HUDSON ON

607

00:30:46,540 --> 00:30:49,090

THE LEFT AND EAST RIVER ON THE
RIGHT.

608

00:30:49,090 --> 00:30:52,710

YOU CAN SEE STARING AT OUR

SCREEN, CENTRAL PARK.

609

00:30:52,710 --> 00:31:03,680

IF YOU LOOK CAREFULLY YOU CAN
SEE THE PONDS IN CENTRAL PARK.

610

00:31:03,680 --> 00:31:07,390

THAT'S JUST WHAT WE'LL DO IN
TERMS OF THE SIMPLE IMAGING.

611

00:31:07,390 --> 00:31:12,710

WHEN WE ADD THE THERMAL MASS,
LETTING US RECONSTRUCT THE

612

00:31:12,710 --> 00:31:17,460

TOPOGRAPHY, ALL THE STUDIES OF
THE ATMOSPHERE AND ALL THE OTHER

613

00:31:17,460 --> 00:31:21,540

THINGS WE'RE GOING TO DO, WE'LL
WRITE THE TEXTBOOK OVERNIGHT AND

614

00:31:21,540 --> 00:31:23,710

WE'LL BRING YOU ALONG FOR THE
RIDE.

615

00:31:23,710 --> 00:31:28,960

NOT JUST ON NASA TELEVISION BUT
WITH SOCIAL MEDIA, WITH WEB

616

00:31:28,960 --> 00:31:33,510

SITES, WITH INSTANTANEOUS IMAGE
RELEASES, NEXT DAY IMAGE

617

00:31:33,510 --> 00:31:35,180

RELEASES.

618

00:31:35,180 --> 00:31:37,720

AND WE'RE GOING TO ANSWER YOUR
QUESTIONS ALONG THE WAY.

619

00:31:37,720 --> 00:31:42,030

WE'RE BASICALLY DOING ONE OF THE
HISTORIC MISSIONS FROM THE '60s

620

00:31:42,030 --> 00:31:48,950

OR '70s WITH 2 CENTURY MEDIA
SENSIBILITIES.

621

00:31:48,950 --> 00:31:50,530

WE CAN'T WAIT TO BRING YOU
ALONG.

622

00:31:50,530 --> 00:31:52,000

THANK YOU VERY MUCH.

623

00:31:52,000 --> 00:31:54,660

AND I'LL TAKE YOUR QUESTIONS.

624

00:31:54,660 --> 00:31:55,730

>> ALL RIGHT.

625

00:31:55,730 --> 00:32:03,410

FOR THOSE FOLLOWING ONLINE AT
HOME, ASK NASA HASHTAG.

626

00:32:03,410 --> 00:32:07,700

JONATHAN ASK, WHAT DOES THE
BEHAVIOR OF THE MOON IMPLY FOR

627

00:32:07,700 --> 00:32:10,770

POTENTIALLY HAZARDOUS DEBRIS IN
THE PATH OF NEW HORIZONS?

628

00:32:10,770 --> 00:32:13,510

>> THAT'S A GREAT QUESTION.

629

00:32:13,510 --> 00:32:16,680

FOR THOSE OF YOU WHO DON'T KNOW,

WE'RE BEING VERY CAREFUL.

630

00:32:16,680 --> 00:32:20,350

WE KNOW PLUTO'S SMALLEST
SATELLITES HAVE SO LITTLE

631

00:32:20,350 --> 00:32:23,780

GRAVITY THAT WHEN THEY'RE CRATE
ERRED, THE MATERIAL THAT COMES

632

00:32:23,780 --> 00:32:27,820

OUT, GETS INTO ORBIT AROUND
PLUTO.

633

00:32:27,820 --> 00:32:30,620

BECAUSE OUR SPACECRAFT IS MOVING
SO FAST.

634

00:32:30,620 --> 00:32:36,220

EVEN AN IMPACT BY A RICE
PELLET-SIZED PEBBLE OR PIECE OF

635

00:32:36,220 --> 00:32:40,830

DEBRIS FROM THOSE MOONS COULD
CAUSE GREAT DAMAGE.

636

00:32:40,830 --> 00:32:43,610

SO WE'RE CONDUCTING A HAZARD
WATCH ON THE WAY IN.

637

00:32:43,610 --> 00:32:45,610

WE HAVEN'T FOUND ANYTHING THAT'S
CONCERNING YET.

638

00:32:45,610 --> 00:32:49,000

THE BEST MODELS INDICATE WE
PROBABLY NEVER WILL.

639

00:32:49,000 --> 00:32:51,390

YOU WE'RE NOT TAKING ANY

CHANCES.

640

00:32:51,390 --> 00:32:53,510

SO WE PREPARE BACK-UP PLANS.

641

00:32:53,510 --> 00:32:56,790

AND I THINK WHAT THE QUESTIONER
IS ASK ABOUT THE NEW DISCOVERS

642

00:32:56,790 --> 00:33:00,410

JUST ANNOUNCED FROM THE HUBBELL
SPACE TELESCOPE, THAT THE MOONS

643

00:33:00,410 --> 00:33:08,410

ARE ORBITING CHAOTICALLY.

644

00:33:08,410 --> 00:33:10,960

IT'S A REALLY GOOD QUESTIONS AND
VERY TOPICAL.

645

00:33:10,960 --> 00:33:11,960

>> WONDERFUL.

646

00:33:11,960 --> 00:33:14,280

DO WE HAVE A QUESTION IN THE
ROOM?

647

00:33:14,280 --> 00:33:16,680

ALL RIGHT.

648

00:33:16,680 --> 00:33:17,990

WAIT FOR THE MICROPHONE.

649

00:33:17,990 --> 00:33:18,990

>> HI.

650

00:33:18,990 --> 00:33:19,990

YES.

651
00:33:19,990 --> 00:33:24,630
I WAS WONDERING WHAT INSTRUMENTS
ON THE SPACECRAFT DO YOU USE TO

652
00:33:24,630 --> 00:33:33,750
TEST THE CHEMICAL COMPOSITION ON
PLUTO, AND HOW DO THEY WORK?

653
00:33:33,750 --> 00:33:37,080
>> WE HAVE SPECTROMETERS.

654
00:33:37,080 --> 00:33:47,960
IT BREAKS UP THE LIGHT IN THE
ULTRA VIE LOT BAND SO WE CAN SEE

655
00:33:47,960 --> 00:33:53,530
A ATOMS AND MOLECULES GLOWING
FROM THEIR INTERACTION WITH

656
00:33:53,530 --> 00:33:54,530
SUNLIGHT.

657
00:33:54,530 --> 00:33:56,840
THAT LETS US FINGERPRINT THE
COMPOSITION OF PLUTO'S

658
00:33:56,840 --> 00:33:57,840
ATMOSPHERE.

659
00:33:57,840 --> 00:34:01,230
IT WILL LET US DETERMINE THE
DENSITY OF THE ATMOSPHERE AS A

660
00:34:01,230 --> 00:34:03,230
FUNCTION OF ALTITUDE.

661
00:34:03,230 --> 00:34:10,109
WE ALSO HAVE INFRARED
SPECTROMETER ON BOARD.

662

00:34:10,109 --> 00:34:13,800

IT BREAKS UP THE LIGHT INTO ITS
INDIVIDUAL WAVELENGTHS BUT IT IS

663

00:34:13,800 --> 00:34:18,349

USED FOR STUDYING THE SURFACES
OF THE WORLD AND THEIR

664

00:34:18,349 --> 00:34:19,349

COMPETITION.

665

00:34:19,349 --> 00:34:22,730

ULTRA VIOLET IS CALLED ALICE.

666

00:34:22,730 --> 00:34:24,740

ITS HONEYMOONER IS RALPH.

667

00:34:24,740 --> 00:34:32,060

RALPH IS THE INFRARED
SPECTROMETER.

668

00:34:32,060 --> 00:34:33,230

THANK YOU.

669

00:34:33,230 --> 00:34:34,260

>> WONDERFUL.

670

00:34:34,260 --> 00:34:36,530

OUR NEXT QUESTION IS GOING TO
COME FROM LOWELL.

671

00:34:36,530 --> 00:34:37,570

>> HI.

672

00:34:37,570 --> 00:34:38,610

ENZO.

673

00:34:38,610 --> 00:34:47,990
THE DOCTOR INFORMED ME THERE IS
NO MAGNETOMETER.

674
00:34:47,990 --> 00:34:56,819
WILL BE THERE ENOUGH FOR A
FOLLOW-ON MISSION?

675
00:34:56,819 --> 00:34:59,410
>> A LITTLE BIT OF BACKGROUND
FOR EVERYBODY ELSE.

676
00:34:59,410 --> 00:35:03,420
THEY ARE THE TWO INSTRUMENTS
THAT STUDY CHARGED PARTICLES,

677
00:35:03,420 --> 00:35:04,470
PLASMA.

678
00:35:04,470 --> 00:35:09,250
ACTUALLY, THEY HAVE BEEN USED TO
STUDY THE SAME THING ALL THE WAY

679
00:35:09,250 --> 00:35:14,520
ACROSS THE SOLAR SYSTEM AS WE
HAVE TRANSECTED ALL THE WAY OUT

680
00:35:14,520 --> 00:35:16,370
TO THE KUIPER BELT.

681
00:35:16,370 --> 00:35:21,080
PEPSI AND SWAP ARE PRIMARILY
THERE TO STUDY GASES COMING OFF

682
00:35:21,080 --> 00:35:23,910
PLUTO'S ATMOSPHERE, ESCAPING
INTO THE ATMOSPHERE TO DETERMINE

683
00:35:23,910 --> 00:35:25,480
ITS ESCAPE RATE.

684

00:35:25,480 --> 00:35:29,030

IN ADDITION, SOME OF THE
SIGNATURES THEY COULD DETECT

685

00:35:29,030 --> 00:35:33,130

COULD REVEAL WHETHER PLUTO HAS A
STRONG MAGNETIC FIELD OR NOT.

686

00:35:33,130 --> 00:35:38,430

ACCORDING TO STANDARD THEORY,
SMALL WORLDS, SMALL PLANETS, AND

687

00:35:38,430 --> 00:35:41,970

ASTERIODS DON'T TYPICALLY HAVE
STRONG MAGNETIC FIELDS.

688

00:35:41,970 --> 00:35:46,750

WE HAD TO MAKE MANY CHOICES IN
ORDER TO GET A MISSION TO PLUTO

689

00:35:46,750 --> 00:35:53,100

TO NOT CARRY EVERYTHING THAT YOU
COULD POSSIBLY THINK OF.

690

00:35:53,100 --> 00:35:59,170

MAGNOTOMETER, WE LEFT THAT OFF
THE PAY LOAD.

691

00:35:59,170 --> 00:36:03,550

IF PLUTO HAS A STRONG MAGNETIC
SIGNATURE, THAT WILL NOT ONLY

692

00:36:03,550 --> 00:36:08,390

SURPRISE THE GEO PHYSICISTS, IT
WILL MAKE ITSELF KNOWN IN THE

693

00:36:08,390 --> 00:36:10,160

DATA FROM PEPSI AND SWAP.

694

00:36:10,160 --> 00:36:13,590

OUR TEAM IS CALLED PARTICLES IN
PLASMA, PART OF THE SCIENCE

695

00:36:13,590 --> 00:36:17,830

TEAM, IS VERY ANXIOUS TO SEE THE
DATA FROM THE CLOSEST APPROACH

696

00:36:17,830 --> 00:36:20,250

TO SEE WHETHER THEY ARE
SURPRISED BY THAT.

697

00:36:20,250 --> 00:36:21,250

>> ALL RIGHT.

698

00:36:21,250 --> 00:36:23,109

NEXT QUESTION COMES FROM HERE IN
THE ROOM.

699

00:36:23,109 --> 00:36:24,109

>> HI.

700

00:36:24,109 --> 00:36:26,780

THANK YOU FOR TAKING THESE
QUESTIONS.

701

00:36:26,780 --> 00:36:31,880

SO WE LEARNED TODAY THAT THE
DATA FROM EARTH TO NEW HORIZONS

702

00:36:31,880 --> 00:36:34,280

WILL TAKE ABOUT FOUR AND A HALF
HOURS.

703

00:36:34,280 --> 00:36:36,330

AND THEN IT WILL BE ANOTHER FOUR
AND A HALF HOURS BEFORE IT COMES

704

00:36:36,330 --> 00:36:37,330

BACK.

705

00:36:37,330 --> 00:36:40,920

I WANT TO KNOW IF YOU HAD ANY
PLAN FOR THAT NINE-HOUR WINDOW?

706

00:36:40,920 --> 00:36:43,830

MAYBE SOME GOLF OR MAYBE A NICE
SHOW OR A BOOK?

707

00:36:43,830 --> 00:36:45,540

IT'S GOING TO BE A WHILE.

708

00:36:45,540 --> 00:36:46,540

>> YEAH.

709

00:36:46,540 --> 00:36:50,080

LET ME TELL YOU ABOUT CLOSEST
APPROACH.

710

00:36:50,080 --> 00:36:53,050

WE DESIGNED NEW HORIZONS TO BE
EXTREMELY EFFECTIVE WHEN IT'S

711

00:36:53,050 --> 00:36:54,170

THERE.

712

00:36:54,170 --> 00:36:56,560

WE HAVE VERY FAST SPEEDS ON THE
SPACECRAFT.

713

00:36:56,560 --> 00:36:59,550

WE CAN TAKE DATA FROM UP TO FIVE
INSTRUMENTS AT ONCE.

714

00:36:59,550 --> 00:37:04,800

WE HAVE SOLID STRAIGHT MEMORY BY
SPACECRAFT MEMORIES.

715

00:37:04,800 --> 00:37:08,510
WE TAKE 100 TIMES AS MUCH DATA
ON CLOSE APPROACH AS WE CAN SEND

716
00:37:08,510 --> 00:37:10,040
BACK IN A SINGLE DAY.

717
00:37:10,040 --> 00:37:13,270
SO NEW HORIZONS WILL BE THE GIFT
THAT KEEPS ON GIVING LONG AFTER

718
00:37:13,270 --> 00:37:16,991
WE PASS THE PLUTO SYSTEM, NO
IMAGES WILL BE COMING TO THE TO

719
00:37:16,991 --> 00:37:19,680
THE GROUND FOR THE SCIENCE TEAM
AND FOR ALL OF YOU, FOR

720
00:37:19,680 --> 00:37:20,680
EVERYONE.

721
00:37:20,680 --> 00:37:25,740
NOW, AS WE MAKE OUR JOURNEY
THROUGH CLOSEST APPROACH, WE

722
00:37:25,740 --> 00:37:30,060
HAVE A CHOICE WE MADE A LONG
TIME AGO, WHICH IS WE CAN EITHER

723
00:37:30,060 --> 00:37:33,340
TAKE AS MUCH DATA AS POSSIBLE OR
WE CAN TALK TO THE EARTH.

724
00:37:33,340 --> 00:37:35,400
WE TOLD TO TAKE AS MUCH DATA AS
POSSIBLE.

725
00:37:35,400 --> 00:37:38,920
ON CLOSEST APPROACH DAY, THE

SPACECRAFT ACTUALLY WON'T BE

726

00:37:38,920 --> 00:37:42,010

COMMUNICATING WITH EARTH UNTIL
LATE IN THE EVENING.

727

00:37:42,010 --> 00:37:48,490

THE LAST IMAGE WILL COME DOWN
LATE ON THE 13th OF JULY.

728

00:37:48,490 --> 00:37:50,680

AND ALL THROUGHOUT THE 14th
THERE WILL BE NO IMAGES.

729

00:37:50,680 --> 00:37:55,470

THE BIG DOWNLOAD IS WEDNESDAY,
THE 15th.

730

00:37:55,470 --> 00:37:58,530

THAT DATA DOES TAKE FOUR AND A
HALF HOURS FROM THE SPACECRAFT

731

00:37:58,530 --> 00:37:59,620

TOP REACH EARTH.

732

00:37:59,620 --> 00:38:07,350

AFTER ONE IMAGES COMES DOWN, THE
NEXT ONE, SPECTROSCOPY, PEPSI

733

00:38:07,350 --> 00:38:09,040

AND SWAP.

734

00:38:09,040 --> 00:38:15,650

WE WILL GIVE THE MISSIONS TEAM A
WELL-DESERVED REST.

735

00:38:15,650 --> 00:38:19,920

THEN WE WILL COME PACK AND START
A MORE THAN YEAR-LONG DOWN LINK

736

00:38:19,920 --> 00:38:24,000

TO LINK THE MEMORIES BACK TO
EARTH AND FILL UP THE DATA BANKS

737

00:38:24,000 --> 00:38:25,000

HERE.

738

00:38:25,000 --> 00:38:26,740

>> ALL RIGHT.

739

00:38:26,740 --> 00:38:27,740

WONDERFUL.

740

00:38:27,740 --> 00:38:30,060

OUR NEXT QUESTION COMES FROM
LOWELL.

741

00:38:30,060 --> 00:38:31,330

>> HI.

742

00:38:31,330 --> 00:38:36,640

THANK YOU FOR TAKING THE
QUESTION.

743

00:38:36,640 --> 00:38:38,440

THIS IS MICHAEL KAISER FROM NASA
SOCIAL AT LOWELL.

744

00:38:38,440 --> 00:38:44,630

MY QUESTION IS A FOLLOW-UP TO
THE SPECTROMETER.

745

00:38:44,630 --> 00:38:48,160

WILL WE BE ABLE TO DETERMINE THE
FULL CHEMICALS MAKEUPS AND A

746

00:38:48,160 --> 00:38:49,250

PROPORTION OF THOSE MOLECULES?

747

00:38:49,250 --> 00:38:52,119

I'M JUST WONDERING ABOUT THE
RESOLUTION OF THE SPECTROMETERS.

748

00:38:52,119 --> 00:38:56,630

>> THE RESOLUTION OVER THE
ENTIRE BAND PASS FROM 1.25 TO

749

00:38:56,630 --> 00:39:00,560

2.5 MICRONS IS ABOUT 250.

750

00:39:00,560 --> 00:39:02,850

WE HAVE A HIGH RESOLUTION
SEGMENT WITH ABOUT TWICE THAT

751

00:39:02,850 --> 00:39:04,580

RESOLUTION.

752

00:39:04,580 --> 00:39:08,000

SPECTRO RESOLUTION OF ABOUT 500.

753

00:39:08,000 --> 00:39:16,150

IT INCLUDES THE DENSITY OF EACH
SPECIES THAT WE CAN DETECT.

754

00:39:16,150 --> 00:39:20,460

THERE ARE QUITE A WIDE RANGE OF
HYDROCARBONS AND

755

00:39:20,460 --> 00:39:24,290

NITROGEN-BEARING THAT WE CAN
DETECT.

756

00:39:24,290 --> 00:39:29,780

WE WILL BE ON THE LOOKOUT FOR
THOSE.

757

00:39:29,780 --> 00:39:33,370

WE CAN DETECT INDIVIDUAL ATOMIC

SPECIES HIGH ON THE ATMOSPHERE,

758

00:39:33,370 --> 00:39:38,230

LIKE HYDROGEN, WHICH WE THINK IS
PREVALENT ON TOP OF THE PLUTO

759

00:39:38,230 --> 00:39:43,510

ATMOSPHERE AND HAZES AND CLOUDS,
BOTH IN CAMERAS AND

760

00:39:43,510 --> 00:39:44,510

SPECTROMETERS.

761

00:39:44,510 --> 00:39:46,870

IT IS A PRETTY COMPREHENSIVE
INVESTIGATION INTO THE

762

00:39:46,870 --> 00:39:48,320

ATMOSPHERE.

763

00:39:48,320 --> 00:39:52,470

>> AGAIN, WE'RE TAKING QUESTIONS
ON LINE #ASKNASA.

764

00:39:52,470 --> 00:39:59,000

THIS IS PROFESSOR ABLE MENDEZ
ASKS, WHAT'S THE ESTIMATE OF THE

765

00:39:59,000 --> 00:40:04,490

TOTAL ATMOSPHERE ON PLUTO?

766

00:40:04,490 --> 00:40:09,320

>> IT IS DETERMINED FROM
EARTH-BASED STUDIES THAT OBSERVE

767

00:40:09,320 --> 00:40:11,930

THE VERY OCCASIONAL
DISAPPEARANCE OF THE STAR BEHIND

768

00:40:11,930 --> 00:40:13,860
PLUTO AND ITS REAPPEARANCE.

769

00:40:13,860 --> 00:40:18,480
BY GRAPHING THE RATE AT WHICH IT
DECLINES DUE TO ATMOSPHERIC

770

00:40:18,480 --> 00:40:24,700
REFRACTION, WE CAN DETERMINE THE
SCALE HEIGHT AND THE PRESSURE IN

771

00:40:24,700 --> 00:40:25,700
THE ATMOSPHERE.

772

00:40:25,700 --> 00:40:28,840
THE THING THAT WE DON'T KNOW IS
WHETHER WE SINK TO THE BOTTOM

773

00:40:28,840 --> 00:40:30,030
LEVEL OF THE ATMOSPHERE.

774

00:40:30,030 --> 00:40:34,840
SO WE HAVE A LOWER LIMIT OF
ABOUT 10 MICROPARSE.

775

00:40:34,840 --> 00:40:37,690
BUT THE AT MOOSE SEVERE MAY BE
DEEPER THAN WE CAN PROBE FROM

776

00:40:37,690 --> 00:40:40,320
EARTH-BASED.

777

00:40:40,320 --> 00:40:43,410
NEW HORIZONS WILL DETERMINE
THAT.

778

00:40:43,410 --> 00:40:48,330
THE PRESSURE COULD BE AS MUCH AS
5 OR 10 TIMES HIGHER, 50 OR 100

779

00:40:48,330 --> 00:40:49,330

MICROBARS.

780

00:40:49,330 --> 00:40:50,660

THAT'S THE RANGE OF OUR
UNCERTAINTY.

781

00:40:50,660 --> 00:40:53,550

THERE WILL BE NO UNCERTAINTY
AFTER JULY.

782

00:40:53,550 --> 00:40:55,309

WE WILL TELL YOU THE ANSWER.

783

00:40:55,309 --> 00:40:57,140

>> ALL RIGHT.

784

00:40:57,140 --> 00:40:59,000

ANOTHER QUESTION IN THE ROOM.

785

00:40:59,000 --> 00:41:01,520

>> HI, DOCTOR.

786

00:41:01,520 --> 00:41:05,770

EMILY, HISTORY TEACHER AT MORRIS
TECH IN NEW JERSEY.

787

00:41:05,770 --> 00:41:09,040

FIRST OF ALL, I WANT TO SAY I
APPRECIATE THE BASTILLE DAY.

788

00:41:09,040 --> 00:41:13,730

IN A WAY THIS IS REVOLUTIONARY.

789

00:41:13,730 --> 00:41:17,710

THE DIRECTOR SAID THAT THE
MISSIONS IN OUTER SPACE HELP US

790

00:41:17,710 --> 00:41:19,820
LEARN MORE ABOUT EARTH.

791
00:41:19,820 --> 00:41:23,110
SO IS THIS MORE THAN WE LEARN
ABOUT WHAT HUMAN PROGRESS AND

792
00:41:23,110 --> 00:41:27,340
POTENTIAL CAN DO, OR CAN WE
LEARN MORE ABOUT EARTH OR IS IT

793
00:41:27,340 --> 00:41:31,240
THE LATER MISSIONS WE WILL GET
AFTER THIS FIRST ONE OCCURS, IF

794
00:41:31,240 --> 00:41:32,540
THAT MAKES SENSE.

795
00:41:32,540 --> 00:41:33,680
>> I'M REALLY GLAD YOU ASKED
THAT QUESTION.

796
00:41:33,680 --> 00:41:35,450
IT'S AN EXCELLENT QUESTION.

797
00:41:35,450 --> 00:41:39,640
WE CAN LEARN ABOUT THE ORIGIN OF
THE EARTH IN THREE DIFFERENT

798
00:41:39,640 --> 00:41:41,000
WAYS.

799
00:41:41,000 --> 00:41:45,390
THE FIRST IS BY STUDYING THE
PLUTO SYSTEM ITSELF BY STUDYING

800
00:41:45,390 --> 00:41:46,390
SMALL PLANETS.

801

00:41:46,390 --> 00:41:49,840
WE CAN LEARN ABOUT HOW THE
BUILDING BLOCKS THAT WERE THE

802

00:41:49,840 --> 00:41:55,369
LUMPY POTATOES AND PLANETECIMALS
BUILT SMALL PLANETS OUT OF WHICH

803

00:41:55,369 --> 00:41:57,100
BIGGER PLANETS CAME TO EXIST.

804

00:41:57,100 --> 00:42:01,850
AND WE NEVER STUDIED ANY PLANET
LIKE PLUTO BEFORE.

805

00:42:01,850 --> 00:42:02,850
THAT'S THE FIRST WAY.

806

00:42:02,850 --> 00:42:06,470
THE SECOND IS THAT THE ORIGIN OF
PLUTO'S SATELLITE SYSTEM IS

807

00:42:06,470 --> 00:42:10,060
STRONGLY BELIEVED TO BE THE SAME
ORIGIN MECHANISM, A GIANT

808

00:42:10,060 --> 00:42:16,200
COLLISION THAT SPAWNED MATERIAL
OFF OF PLUTO WHERE IT FORMED THE

809

00:42:16,200 --> 00:42:17,590
EARTH-MOON SYSTEM.

810

00:42:17,590 --> 00:42:23,360
IT IS THE ONLY KNOWN EXAMPLE IN
OUR SOLAR SYSTEM OF A FORMATION

811

00:42:23,360 --> 00:42:26,710
MECHANISM FOR ITS SATELLITE LIKE
EARTH-MOON.

812

00:42:26,710 --> 00:42:29,500

SO IT IS VERY IMPORTANT TO
PLANETARY SCIENCES TO HAVE THAT

813

00:42:29,500 --> 00:42:30,640

SECOND EXAMPLE.

814

00:42:30,640 --> 00:42:33,820

AND WE HAVE KNOWN THAT WAS PART
OF THE MOTIVATION FOR GOING TO

815

00:42:33,820 --> 00:42:36,730

THE PLUTO SYSTEM, WAS TO STUDY
THE ORIGIN OF ITS BIG MOON

816

00:42:36,730 --> 00:42:37,730

CHARON.

817

00:42:37,730 --> 00:42:40,170

THERE IS ALSO A THIRD WAY.

818

00:42:40,170 --> 00:42:42,710

THE ATMOSPHERE IS RAPIDLY
ESCAPING.

819

00:42:42,710 --> 00:42:44,300

IN PART BECAUSE PLUTO IS A SMALL
PLANET.

820

00:42:44,300 --> 00:42:48,290

AND IN PART BECAUSE THERE IS A
HEATING MECHANISM THAT ADDS

821

00:42:48,290 --> 00:42:49,610

ENERGY TO THE MOLECULES.

822

00:42:49,610 --> 00:42:54,730

AND THE ESCAPE RATE OF PLUTO'S

ATMOSPHERE, ESCAPE MECHANISM, IS

823

00:42:54,730 --> 00:42:57,580

HYDRODYNAMIC ESCAPE, WHICH IS A
FANCY TERM.

824

00:42:57,580 --> 00:43:00,110

BUT ALL IT REALLY MEANS IS THAT
THE ESCAPE RATE IS MUCH HIGHER

825

00:43:00,110 --> 00:43:01,110

THAN NORMAL.

826

00:43:01,110 --> 00:43:03,730

IT IS DUE TO THAT HIGH
TEMPERATURE.

827

00:43:03,730 --> 00:43:07,200

AND THE SAME THING TOOK PLACE ON
THE EARTH RIGHT AFTER THE EARTH

828

00:43:07,200 --> 00:43:09,140

FORMED, WHICH IT WAS STILL
MOLTEN.

829

00:43:09,140 --> 00:43:11,370

ITS WAS HYDRODYNAMICALLY
ESCAPING.

830

00:43:11,370 --> 00:43:14,680

ORIGINALLY, THE EARTH WAS MADE
OF HYDROGEN AND HELIUM.

831

00:43:14,680 --> 00:43:15,880

THAT'S ALL GONE NOW.

832

00:43:15,880 --> 00:43:19,480

THAT IS THE PROCESS THROUGH
WHICH IT LEFT, HYDRODYNAMIC

833

00:43:19,480 --> 00:43:20,480

ESCAPE.

834

00:43:20,480 --> 00:43:25,450

IT HAS BEEN DISCOVERED BY
THEORISTS ON BLACKBOARDS AND

835

00:43:25,450 --> 00:43:27,960

MODELED IN COMPUTERED, BUT IT
HAS NEVER BEEN OBSERVED ON A

836

00:43:27,960 --> 00:43:29,070

PLANETARY SCALE.

837

00:43:29,070 --> 00:43:35,180

PLUTO IS THE FIRST PLACE WE CAN
GO TO STUDY A PROCESS TO RESHAPE

838

00:43:35,180 --> 00:43:39,369

THE EARTH'S ATMOSPHERE FROM A
POISONOUS ENVELOPE TO THE

839

00:43:39,369 --> 00:43:41,550

ATMOSPHERE WE ENJOY TODAY.

840

00:43:41,550 --> 00:43:43,160

SO THAT'S ANOTHER CONNECTION.

841

00:43:43,160 --> 00:43:45,020

>> THANK YOU.

842

00:43:45,020 --> 00:43:46,430

>> OUR NEXT QUESTION FROM LOWELL
OBSERVATORY.

843

00:43:46,430 --> 00:43:47,430

>> HI.

844

00:43:47,430 --> 00:43:48,430
HI MY NAME IS CASEY.

845
00:43:48,430 --> 00:43:51,420
WHEN MIGHT WE SEE AN ORBITAL
MISSION OR A ROVER MISSION OR

846
00:43:51,420 --> 00:43:59,320
SOME SORT OF LANDING AND WHAT WE
COULD LEARN MORE FROM THAT AS

847
00:43:59,320 --> 00:44:01,510
OPPOSED TO JUST A FLY-BY
MISSION?

848
00:44:01,510 --> 00:44:04,850
>> IT'S HARD TO PREDICT
SOMETHING LIKE THAT.

849
00:44:04,850 --> 00:44:09,610
PLUTO, IF IT IS AS INTERESTING
AS WE EXPECT IT TO BE, I THINK

850
00:44:09,610 --> 00:44:12,600
THE SCIENTIFIC COMMUNITY WILL
WANT TO GO BACK AND MAKE MORE

851
00:44:12,600 --> 00:44:13,930
STUDIES.

852
00:44:13,930 --> 00:44:18,880
ORBITER OR LANDER IS A BEAUTIFUL
MISSION TO FLY NEXT.

853
00:44:18,880 --> 00:44:23,021
OF COURSE TO MAKE THE CASE FOR
THAT AND BUILD THE MISSION AND

854
00:44:23,021 --> 00:44:25,780
TO FLY IT OUT IS PROBABLY A

COUPLE OF DECK 80s.

855

00:44:25,780 --> 00:44:33,680

MAYBE THAT'S FOR THE 2030AFTER
WE FLY TO EUROPA AND LEARN ABOUT

856

00:44:33,680 --> 00:44:35,900

THAT AND THE NEXT MARS ROVERS.

857

00:44:35,900 --> 00:44:39,220

IT DEPENDS ON THE RESULTS AND
HOW EXCITING THEY ARE FROM NEW

858

00:44:39,220 --> 00:44:40,240

HORIZONS.

859

00:44:40,240 --> 00:44:42,690

THAT'S THE KIND OF THING I WOULD
LIKE TO TALK ABOUT A LITTLE BIT

860

00:44:42,690 --> 00:44:43,940

LATER DOWN THE ROAD.

861

00:44:43,940 --> 00:44:48,680

BECAUSE WE'RE FOCUSED ON THE
FIRST RECONNAISSANCE FOR NOW.

862

00:44:48,680 --> 00:44:53,100

>> THE QUESTION CAME IN ON ASK
NASA HERE ASKING FROM TWITTER

863

00:44:53,100 --> 00:44:57,670

USEERS WHO ASKED WHAT WILL BE
THE NEXT OBJECT NEW HORIZONS

864

00:44:57,670 --> 00:45:01,640

WILL BE VISITING AFTER PLUTO?

865

00:45:01,640 --> 00:45:07,180

>> WELL, AFTER PLUTO, AS CALLED
FOR BY THE DECAYEDAL SURVEY, WE

866

00:45:07,180 --> 00:45:10,780
HAVE AN OPPORTUNITY TO GO
FARTHER IN AND STUDY THE

867

00:45:10,780 --> 00:45:16,550
BUILDING BLOCKS THAT DWARF
PLANETS LIKE SECOND THAT,

868

00:45:16,550 --> 00:45:22,670
MACKEY, WE HAVE IDENTIFIED TWO
POTENTIAL TARGETS WITHIN OUR

869

00:45:22,670 --> 00:45:25,410
FUEL SUPPLY WITHIN OUR REACH.

870

00:45:25,410 --> 00:45:29,440
BOTH FLY-BYES WOULD OCCUR IN
2019.

871

00:45:29,440 --> 00:45:31,430
WE CAN GO TO ONE OR THE OTHER
BUT THEY ARE IN DIFFERENT

872

00:45:31,430 --> 00:45:32,430
DIRECTIONS.

873

00:45:32,430 --> 00:45:34,060
SO WE HAVE TO CHOOSE BETWEEN
THEM.

874

00:45:34,060 --> 00:45:37,220
AND WE WILL BE DOING THAT IN
AUGUST.

875

00:45:37,220 --> 00:45:40,869
FOR THAT MISSION TO CULMINATE,
TO ACTUALLY TAKE PLACE, WE HAVE

876

00:45:40,869 --> 00:45:44,340

TO WRITE A PROPOSAL, AS ALL
EXTENDED MISSIONS TO NASA.

877

00:45:44,340 --> 00:45:46,660

THAT WILL BE PEER REVIEWED.

878

00:45:46,660 --> 00:45:51,570

IF IT'S WELL REVIEWEDS NASA
HEADQUARTERS WILL FUND THAT

879

00:45:51,570 --> 00:45:56,250

MISSION OUT TO 2019 OR 2020 TO
CAPTURE THE DATA AND GET IT ALL

880

00:45:56,250 --> 00:45:57,510

BACK TO THE EARTH.

881

00:45:57,510 --> 00:46:00,060

WE'RE LOOKING FORWARD TO WRITING
THAT PROPOSAL VERY MUCH.

882

00:46:00,060 --> 00:46:02,860

WE THINK IT IS EXCITING.

883

00:46:02,860 --> 00:46:07,150

TO GO ANOTHER BILLION MILES AND
EXPLORE THE PRISTINE OBJECTS OUT

884

00:46:07,150 --> 00:46:12,280

OF WHICH SMALL PLANETS WERE MADE
IS AN UNPRECEDENTED OPPORTUNITY

885

00:46:12,280 --> 00:46:16,390

THAT NO OTHER MISSION THAT'S ON
THE DRAWING BOARDS OR IN FLIGHT

886

00:46:16,390 --> 00:46:17,670

CAN ACCOMPLISH.

887

00:46:17,670 --> 00:46:22,020

THAT'S SOMETHING NEW HORIZONS
CAN UNIQUELY CONTRIBUTE.

888

00:46:22,020 --> 00:46:25,070

AND SO WE'RE VERY MUCH LOOKING
FORWARD TO THE OPPORTUNITY TO

889

00:46:25,070 --> 00:46:26,190

PROPOSE THAT.

890

00:46:26,190 --> 00:46:27,730

>> ALL RIGHT.

891

00:46:27,730 --> 00:46:30,010

ANOTHER QUESTION HERE IN THE
ROOM.

892

00:46:30,010 --> 00:46:32,880

>> HI, DOCTOR.

893

00:46:32,880 --> 00:46:36,220

SO THOSE TWO OBJECTS, WHAT WILL
BE YOUR CRITERIA FOR CHOOSING

894

00:46:36,220 --> 00:46:38,890

WHICH YOU DO CHOOSE TO TARGET?

895

00:46:38,890 --> 00:46:39,900

>> ANOTHER GOOD QUESTION.

896

00:46:39,900 --> 00:46:42,530

THERE IS A WHOLE CRITERIA WE'RE
LOOKING AT.

897

00:46:42,530 --> 00:46:47,930

THEY HAVE TO DO WITH HOW MUCH

FUEL WE HAVE AND HOW EXCITING

898

00:46:47,930 --> 00:46:49,430

THE SCIENCE IS.

899

00:46:49,430 --> 00:46:50,920

ONE TAKES MORE FUEL TO REACH.

900

00:46:50,920 --> 00:46:55,040

IT TAKES ALMOST ALL OUR FUEL
SUPPLY JUST TO GET POINTED IN

901

00:46:55,040 --> 00:46:56,990

ITS DIRECTION TO INTERCEPT IT.

902

00:46:56,990 --> 00:47:00,869

THE OTHER TAKES ABOUT HALF OUR
FUEL SUPPLY, LEAVING A LOT MORE

903

00:47:00,869 --> 00:47:03,920

FOR THE ACTUAL SCIENTIFIC
OBSERVATIONS WHEN WE'RE THERE.

904

00:47:03,920 --> 00:47:07,161

WE'RE LOOKING AT OUR ABILITY TO
COMMUNICATE, HOW MUCH POWER WE

905

00:47:07,161 --> 00:47:09,150

WILL HAVE YEARS LATER.

906

00:47:09,150 --> 00:47:14,260

YOU HEARD ABOUT THE HALF LIFE
RADIOACTIVE DECAY THAT LOWERS

907

00:47:14,260 --> 00:47:21,050

EVERY YEAR, THE LIGHTING LEVELS,
THE ESTIMATED SIZES OF THE

908

00:47:21,050 --> 00:47:22,840

OBJECTS.

909

00:47:22,840 --> 00:47:24,710

AND ALSO THEIR PROMINENCE OR
THEIR ORIGIN.

910

00:47:24,710 --> 00:47:30,080

IT TURNS OUT BOTH OBJECTS COME
FROM AN ANCIENT COLD CLASSICAL

911

00:47:30,080 --> 00:47:34,310

OBJECT OF THE KUIPER BELT THAT
WERE ACTUALLY FORMED IN THE VERY

912

00:47:34,310 --> 00:47:35,660

REGION OF THE SOLAR SYSTEM.

913

00:47:35,660 --> 00:47:39,490

NOT TRANSPORTED OUT TO THE
KUIPER BELT BUT FORMED THERE.

914

00:47:39,490 --> 00:47:42,730

SO THEY ACTUALLY TELL US ABOUT
THE CONDITIONS THERE IN THE

915

00:47:42,730 --> 00:47:43,730

BEGINNING.

916

00:47:43,730 --> 00:47:46,180

SO ALL THOSE FACTORS GO INTO THE
MIX.

917

00:47:46,180 --> 00:47:49,300

AND THE TEAM WILL MAKE A
RECOMMENDATION TO NASA LATER

918

00:47:49,300 --> 00:47:50,380

THIS SUMMER.

919

00:47:50,380 --> 00:47:54,150
AND THEN IN THE FALL WE NEED TO
FIRE THE ENGINES.

920
00:47:54,150 --> 00:47:57,310
BECAUSE THE LONGER WE WAIT, THE
MORE AND MORE FUEL IT TAKES.

921
00:47:57,310 --> 00:48:01,400
EVEN IF YOU WAIT UNTIL LATE
2016, JUST A YEAR LATER, BOTH

922
00:48:01,400 --> 00:48:05,390
MISSIONS WOULD TAKE MORE FUEL
THAN WE HAVE ON BOARD.

923
00:48:05,390 --> 00:48:06,510
THANK YOU.

924
00:48:06,510 --> 00:48:07,510
>> DR.

925
00:48:07,510 --> 00:48:08,510
QUESTION FROM DR.

926
00:48:08,510 --> 00:48:10,489
STERN
COMES FROM LOWELL OBSERVATORY.

927
00:48:10,489 --> 00:48:16,170
>> LOWELL HAS NO MORE QUESTIONS.

928
00:48:16,170 --> 00:48:17,170
THANK YOU.

929
00:48:17,170 --> 00:48:18,290
>> THANK YOU VERY MUCH FOR
JOINING US TODAY AND ANSWERING

930

00:48:18,290 --> 00:48:19,290
QUESTIONS.

931
00:48:19,290 --> 00:48:20,290
>> THANK YOU.

932
00:48:20,290 --> 00:48:21,290
>> DEFINITELY.

933
00:48:21,290 --> 00:48:22,290
[APPLAUSE].
>> SO YOU HEARD A LITTLE BIT

934
00:48:22,290 --> 00:48:28,400
ABOUT THE SCIENCE OF WHAT NEW
HORIZONS IS GOING TO ACCOMPLISH.

935
00:48:28,400 --> 00:48:30,510
BUT THAT WOULDN'T HAPPEN WITHOUT
THE HARDWARE.

936
00:48:30,510 --> 00:48:36,200
WE WILL TALK ABOUT THE ACTUAL
SPACECRAFT ITSELF AND WHAT'S ON

937
00:48:36,200 --> 00:48:37,640
BOARD AND EVERYTHING.

938
00:48:37,640 --> 00:48:41,560
UP NEXT TO JOIN US HERE IS CHRIS
HERSMAN, A MISSIONS SYSTEMS

939
00:48:41,560 --> 00:48:43,650
ENGINEER HERE AT THE
OBSERVATORY.

940
00:48:43,650 --> 00:48:47,119
>> THANK YOU, JASON.

941

00:48:47,119 --> 00:48:48,279

>> DEFINITELY.

942

00:48:48,279 --> 00:48:52,210

>> THIS IS MY FAVORITE PART OF
THE MISSION.

943

00:48:52,210 --> 00:48:56,410

UNFORTUNATELY, IT'S OUR JOB TO
CARRY THOSE INSTRUMENTS TO PLUTO

944

00:48:56,410 --> 00:48:58,560

AND TAKE ALL THOSE OBSERVATIONS.

945

00:48:58,560 --> 00:49:00,030

SO I WAS INVOLVED IN THE
DEVELOPMENT.

946

00:49:00,030 --> 00:49:02,190

I WAS THE SPACECRAFT SYSTEMS
ENGINEER WHEN WE WERE BUILDING

947

00:49:02,190 --> 00:49:06,910

IT AND PROMOTED TO THE MISSION
SYSTEMS ENGINEER AFTER LAUNCH.

948

00:49:06,910 --> 00:49:09,170

AND I'M GOING TO GO OVER AND
GIVE YOU A LITTLE TOUR AROUND

949

00:49:09,170 --> 00:49:10,170

THE SPACECRAFT.

950

00:49:10,170 --> 00:49:12,500

YOU HAVE HEARD A LOT ABOUT THE
INSTRUMENTS ALREADY.

951

00:49:12,500 --> 00:49:14,300

JUST TO GIVE YOU A LITTLE
PERSPECTIVE ON THE SIZE.

952

00:49:14,300 --> 00:49:15,520

I ALWAYS USE MY ARMS.

953

00:49:15,520 --> 00:49:20,700

I STRETCH MY ARMS AND SAY THE
ANTENNA IS JUST A LITTLE BIT

954

00:49:20,700 --> 00:49:22,370

LONGER THAN YOU CAN REACH.

955

00:49:22,370 --> 00:49:26,570

IT IS APPROXIMATELY 80 INCHES.

956

00:49:26,570 --> 00:49:30,500

AND THE WHOLE SPACECRAFT IS LIKE
A GRAND PIANO.

957

00:49:30,500 --> 00:49:33,210

ON THIS END OF THE SPACECRAFT,
THIS IS ALL HANGING OUT BY

958

00:49:33,210 --> 00:49:35,170

ITSELF OVER HERE.

959

00:49:35,170 --> 00:49:37,250

YOU MIGHT SAY, WELL, WHY IS
THAT?

960

00:49:37,250 --> 00:49:40,510

THERE ARE A COUPLE REASONS FOR
THAT.

961

00:49:40,510 --> 00:49:42,780

IT PROVIDES BALANCE FOR THE
SPINNING MODE.

962

00:49:42,780 --> 00:49:48,130

I BROUGHT A LITTLE PROP HERE TO

DESCRIBE THAT.

963

00:49:48,130 --> 00:49:50,420

IT WAS VERY EXPENSIVE TO MAKE.

964

00:49:50,420 --> 00:49:53,640

SO THEY WOULDN'T LET ME THROW
THE MODELS AROUND.

965

00:49:53,640 --> 00:49:59,220

BUT BY BALANCING THE RTG, THE
POWER SOURCE, OUT ON THE END BY

966

00:49:59,220 --> 00:50:02,460

ITSELF AND ALL THE INSTRUMENTS
ON THE OTHER SIDE, YOU GET

967

00:50:02,460 --> 00:50:05,350

SOMETHING THAT WILL SPIN.

968

00:50:05,350 --> 00:50:09,040

AND THEN YOU DON'T HAVE TO USE
THRUSTERS TO KEEP THE SPACECRAFT

969

00:50:09,040 --> 00:50:10,040

POINTED AT THE EARTH.

970

00:50:10,040 --> 00:50:14,280

SO IF YOU ALL WERE THE EARTH AND
IT'S SPINNING THIS WAY, YOU KEEP

971

00:50:14,280 --> 00:50:17,650

THE HIGH GAIN ANTENNA POINTED AT
EARTH WITHOUT BURNING ANY FUEL.

972

00:50:17,650 --> 00:50:23,090

THAT'S THE WAY WE GET OUT TO
PLUTO WITHOUT HAVING A LOT OF

973

00:50:23,090 --> 00:50:26,830
EXTRA FUEL ON BOARD TO KEEP THE
SPACECRAFT POINTED.

974
00:50:26,830 --> 00:50:30,530
WHEN WE'RE IN A THREE AXIS MODE,
WHICH IS WHAT WE'RE DOING AT

975
00:50:30,530 --> 00:50:36,260
PLUTO, THE THRUSTERS SCATTERED
AROUND THE SPACECRAFT AND

976
00:50:36,260 --> 00:50:39,670
PRECISELY POSITIONED SO YOU CAN
MANEUVER ANY WAY.

977
00:50:39,670 --> 00:50:46,170
IN ORDER TO POINT TO EARTH IN
OUR THREE AXIS MODE, YOU HAVE TO

978
00:50:46,170 --> 00:50:49,119
THRUST BACK AND FORTH TO KEEP
THE HIGH GAIN ANTENNA FOCUSED ON

979
00:50:49,119 --> 00:50:50,840
EARTH.

980
00:50:50,840 --> 00:50:52,420
IT USES FUEL, THRUSTER CYCLES.

981
00:50:52,420 --> 00:50:56,000
THOSE ARE CONSUMABLE ON THE
SPACECRAFT.

982
00:50:56,000 --> 00:50:59,960
SO I'M GOING TO MOVE DOWN TO THE
YOU FIRST INSTRUMENT WE WILL

983
00:50:59,960 --> 00:51:01,900
TALK ABOUT, WHICH IS ALICE.

984

00:51:01,900 --> 00:51:09,040

THIS IS THE ULTRA VIOLET ONE.

985

00:51:09,040 --> 00:51:11,510

I WANT TO TALK ABOUT HOW IT'S
POSED.

986

00:51:11,510 --> 00:51:14,820

THERE IS AN APERTURE POINTING IN
THIS DIRECTION, WHICH GIVES YOU

987

00:51:14,820 --> 00:51:20,850

THE OCCULTATION MEASUREMENT,
SIMULTANEOUS WITH THE RADIO

988

00:51:20,850 --> 00:51:22,130

SCIENCE EXPERIMENT.

989

00:51:22,130 --> 00:51:28,480

SO IT IS SPINNING AT EARTH AT
THE SAME TIME ALICE IS POINTED

990

00:51:28,480 --> 00:51:29,710

AT THE SUN.

991

00:51:29,710 --> 00:51:35,840

THEY BOTH MEASURE AS THEY
TRAVERSE INTO THE ATMOSPHERE AND

992

00:51:35,840 --> 00:51:38,130

MAKE MEASUREMENTS ALONG THE WAY.

993

00:51:38,130 --> 00:51:41,390

AS YOU HEARD EARLIER ABOUT THE
AIR GLOW, THIS IS WHERE THE

994

00:51:41,390 --> 00:51:44,630

MEASUREMENTS ARE TAKEN WHERE

YOU'RE LOOKING AT PLUTO.

995

00:51:44,630 --> 00:51:46,660

AND IT'S MUCH MORE SENSITIVE.

996

00:51:46,660 --> 00:51:50,930

THE SOLAR OCULTATION LOOK AT THE
SUN.

997

00:51:50,930 --> 00:51:54,270

THE AIR FLOW APERTURE LOOKS AT
PLUTO.

998

00:51:54,270 --> 00:52:01,140

AND THE RALPH INSTRUMENT, WHICH
IS THE INFRARED INVISIBLE CAMERA

999

00:52:01,140 --> 00:52:02,140

ON THE SPACECRAFT.

1000

00:52:02,140 --> 00:52:04,130

YOU'LL NOTICE THE BIG WHITE AREA
IS THE RADIATOR.

1001

00:52:04,130 --> 00:52:07,470

THAT IS TO KEEP THE INFRARED
PART OF THE INSTRUMENT VERY

1002

00:52:07,470 --> 00:52:08,470

COLD.

1003

00:52:08,470 --> 00:52:10,900

IT IS DOUBLE RADIATOR.

1004

00:52:10,900 --> 00:52:12,960

THE SPACECRAFT IS VERY WARM
INSIDE.

1005

00:52:12,960 --> 00:52:17,420

WELL, IT'S ROOM TEMPERATURE,
WHICH IN SPACE IS VERY WARM.

1006

00:52:17,420 --> 00:52:20,550

AND THIS INSTRUMENT IS VERY
COLD.

1007

00:52:20,550 --> 00:52:23,760

AND SO WHAT THEY DO IS THEY HAVE
TWO RADIATORS TO KEEP THIS ONE

1008

00:52:23,760 --> 00:52:27,280

VERY COLD AND THIS ONE KEEPS
ISOLATES EVEN FURTHER.

1009

00:52:27,280 --> 00:52:30,670

AND THEN THERE IS A FEED THAT
GOES IN THERE AND CONNECTS TO

1010

00:52:30,670 --> 00:52:36,030

THE ELECTRONICS THAT IS THE
DETECTOR OF THE INSTRUMENT.

1011

00:52:36,030 --> 00:52:42,451

SO WHEN IT TAKES INFRARED IMAGES
IT CAN GET LESS NOISE IN THE

1012

00:52:42,451 --> 00:52:44,820

INSTRUMENT.

1013

00:52:44,820 --> 00:52:47,250

NOW WE WILL MOVE TO THE OTHER
SIDE OF THE SPACECRAFT, AND YOU

1014

00:52:47,250 --> 00:52:52,400

WILL SEE THE THERMAL ELECTRIC
GENERATOR.

1015

00:52:52,400 --> 00:52:53,400

IT'S BLACK.

1016

00:52:53,400 --> 00:52:56,490

IT'S ALSO VERY HOT INSIDE.

1017

00:52:56,490 --> 00:53:01,859

AND THE HEAT FROM THE INSIDE AND
THE COLD OUTSIDE IN SPACE ALLOWS

1018

00:53:01,859 --> 00:53:05,330

US TO GENERATE ELECTRICITY FROM
THAT TEMPERATURE DIFFERENTIAL.

1019

00:53:05,330 --> 00:53:09,540

AND IT ONLY GENERATES 200 WATTS
WHEN WE'RE AT PLUTO.

1020

00:53:09,540 --> 00:53:11,330

IT GENERATES A LOT MORE HEAT.

1021

00:53:11,330 --> 00:53:15,340

SO WE ACTUALLY SAVED SOME OF THE
ELECTRIC POWER BY PUTTING A

1022

00:53:15,340 --> 00:53:18,150

LITTLE HOLE IN THE END OF HERE
INSIDE THE SPACECRAFT.

1023

00:53:18,150 --> 00:53:22,740

AND WE RECAPTURE SOME OF THAT
HEAT AND PUT IT BACK INTO THE

1024

00:53:22,740 --> 00:53:24,220

SPACECRAFT TO KEEP IT WARM.

1025

00:53:24,220 --> 00:53:31,230

AND THERE WAS A LOT OF
CALCULATIONS THAT WENT INTO THE

1026

00:53:31,230 --> 00:53:33,030

DESIGN OF HOW BIG THAT HOLE
SHOULD BE.

1027

00:53:33,030 --> 00:53:40,800

AND WE ACTUALLY TESTED IT HERE
ON EARTH WHEN WE LAUNCHED IT.

1028

00:53:40,800 --> 00:53:44,200

ONCE WE GET THE HEAT THAT WE
REALLY WANT TO KEEP IN THE

1029

00:53:44,200 --> 00:53:46,190

SPACECRAFT, WE WANT TO REJECT
ALL THE OTHER HEAT, WHICH IS

1030

00:53:46,190 --> 00:53:48,700

WHAT THIS LITTLE SHIELD IS FOR.

1031

00:53:48,700 --> 00:53:51,780

IT KEEPS ALL THE HEAT AWAY FROM
THE OTHER INSTRUMENTS BECAUSE

1032

00:53:51,780 --> 00:53:55,980

THEY WANT TO†-- THEY DON'T WANT
TO BE KIND OF ALTERED BY THAT

1033

00:53:55,980 --> 00:53:56,980

HEAT.

1034

00:53:56,980 --> 00:53:59,990

AND THEN YOU'LL NOTICE HERE THAT
A PYRAMID SHAPE, WHICH WE WERE

1035

00:53:59,990 --> 00:54:03,280

ABLE TO ADJUST THE DESIGN TO
HELP BALANCE THE SPACECRAFT.

1036

00:54:03,280 --> 00:54:05,800

AND IN THE DEVELOPMENT WE
ACTUALLY CHANGED THAT A LITTLE

1037

00:54:05,800 --> 00:54:06,800

BIT.

1038

00:54:06,800 --> 00:54:09,740

NOT PHYSICALLY, BUT IN THE
DESIGN PHASE, TO HELP BALANCE

1039

00:54:09,740 --> 00:54:13,640

OUT ONCE WE FIGURED OUT WHERE
ALL THESE THINGS WOULD BE ON THE

1040

00:54:13,640 --> 00:54:14,640

SPACECRAFT.

1041

00:54:14,640 --> 00:54:16,090

SO NOW WE WILL GO UP TO THE HIGH
GAIN ANTENNA.

1042

00:54:16,090 --> 00:54:20,510

WE WILL SEE THERE WERE A LOT†--
THIS IS THE ASSEMBLY OF THE HIGH

1043

00:54:20,510 --> 00:54:21,510

GAIN ANTENNA.

1044

00:54:21,510 --> 00:54:23,230

THERE WERE A LOT OF ANTENNAS ON
HERE.

1045

00:54:23,230 --> 00:54:28,350

LOW GAIN ANTENNA WAS USED AT
LAUNCH BECAUSE IT CAN SEE ONE

1046

00:54:28,350 --> 00:54:32,180

HEMISPHERE OF THE EARTH OR
WHEREVER IT'S POINTED.

1047

00:54:32,180 --> 00:54:34,540

AND THEN THERE'S ANOTHER ONE
JUST LIKE IT ON THE BOTTOM SIDE.

1048

00:54:34,540 --> 00:54:37,390

IF THE SPACECRAFT COMES OFF AND
IT IS POINT INDEED AN ODD

1049

00:54:37,390 --> 00:54:39,570

DIRECTION WE CAN TALK TO THE
SPACECRAFT.

1050

00:54:39,570 --> 00:54:43,119

RIGHT NOW IT IS SO FAR AWAY THEY
ARE USELESS.

1051

00:54:43,119 --> 00:54:44,470

WE DON'T USE THESE ANYMORE.

1052

00:54:44,470 --> 00:54:48,320

WE HAVE ONE FOR OUR BEACON MODE.

1053

00:54:48,320 --> 00:54:53,000

WHEN WE'RE SPINNING MODE AND NOT
POINTED DIRECTLY AT THE EARTH,

1054

00:54:53,000 --> 00:54:56,710

WE CAN USE THIS TO TELL US THE
SPACECRAFT IS FINE.

1055

00:54:56,710 --> 00:55:01,300

WE POINT IT IN A SPECIFIC
DIRECTION WHERE THE FUTURE THE

1056

00:55:01,300 --> 00:55:04,540

EARTH WILL BE IN THE CENTER OF
THE ANTENNA.

1057

00:55:04,540 --> 00:55:08,349

WE CAN TALK TO IT ONCE A WEEK†--
ACTUALLY, WE CAN LISTEN TO IT

1058

00:55:08,349 --> 00:55:12,820

ONCE A WEEK AND THE SPACECRAFT
WILL SAY EVERYTHING'S FINE AND

1059

00:55:12,820 --> 00:55:14,690

I'M DOING WHAT I'M SUPPOSED TO
BE DOING.

1060

00:55:14,690 --> 00:55:21,190

AND THEN THE HIGH GAIN TEN
THAT IS REALLY IMPORTANT FOR

1061

00:55:21,190 --> 00:55:25,130

RADIO SCIENCE.

1062

00:55:25,130 --> 00:55:33,460

THEY BOUNCE OFF THIS LARGE DISH
AND REFLECT OFF THE BACKSIDE OF

1063

00:55:33,460 --> 00:55:39,000

THIS ANTENNA AND GO INTO THE
FEED OF THE ANTENNA.

1064

00:55:39,000 --> 00:55:41,800

AND THAT ALLOWED US THE
COMBINATION OF THIS AND THAT

1065

00:55:41,800 --> 00:55:43,550

ALLOWED US TO SHAPE THE PEOPLE.

1066

00:55:43,550 --> 00:55:46,000

SO IT'S NOT JUST A ROUND BEAM.

1067

00:55:46,000 --> 00:55:50,619

IT'S ACTUALLY SHAPED IN A WAY
THAT GIVES YOU KIND OF A FLATTOP

1068

00:55:50,619 --> 00:55:52,510

OF THE GAIN OF THE ANTENNA.

1069

00:55:52,510 --> 00:55:57,400

IT GIVES US OUR HIGH GAIN WIDTH.

1070

00:55:57,400 --> 00:56:01,710

IT HELPS SAVE ON THRUSTER USAGE.

1071

00:56:01,710 --> 00:56:05,810

NOW THE NEXT SET OF INSTRUMENTS
ON THE OTHER SIDE.

1072

00:56:05,810 --> 00:56:09,220

THIS IS THE SOLAR WIND OF PLUTO
SWAP EXPERIMENT.

1073

00:56:09,220 --> 00:56:11,490

YOU CAN SEE THE LAUNCH DOORS ARE
DEPLOYED.

1074

00:56:11,490 --> 00:56:16,440

IT HAS A LARGE FAN-LIKE FIELD OF
VIEW.

1075

00:56:16,440 --> 00:56:20,240

ALL THE WAY AROUND IT CAN
RECEIVE SIGNALS.

1076

00:56:20,240 --> 00:56:24,400

AND THE ADVANTAGE OF THAT IS
THAT WHILE THE CAMERAS ARE ALL

1077

00:56:24,400 --> 00:56:27,770

POINTING AROUND AND LOOKING,
THIS CAN STILL MAKE ITS

1078

00:56:27,770 --> 00:56:30,950

MEASUREMENTS BECAUSE IT HAS SUCH
A WILD FIELD OF VIEW IN THIS

1079

00:56:30,950 --> 00:56:31,950

PLANE.

1080

00:56:31,950 --> 00:56:35,750

THE SAME IF WE GO UP TO THE
PEPSI INSTRUMENTS IT HAS A FAN

1081

00:56:35,750 --> 00:56:39,610

BEAM ANTENNA, WHICH YOU CAN SEE
UP HERE.

1082

00:56:39,610 --> 00:56:45,290

AND I THINK IT WILL GO SOON.

1083

00:56:45,290 --> 00:56:51,060

YOU CAN SEE THE FAN BEAM OF THE
ENERGETIC PARTICLE INSTRUMENT,

1084

00:56:51,060 --> 00:56:53,020

PEPSI.

1085

00:56:53,020 --> 00:56:57,750

AND THEN THERE'S ALSO THIS HERE
TO SHIELD THE SOLAR INFLUENCE.

1086

00:56:57,750 --> 00:57:01,401

ACTUALLY, IT WAS THE SHIELD THAT
INTERACTS WITH THE HIGH GAIN

1087

00:57:01,401 --> 00:57:03,740

ANTENNA BECAUSE OF WHERE IT'S
PLACED.

1088

00:57:03,740 --> 00:57:09,560

AND NOW THE LONG-RANGE IMAGEER,
IS THE BIGGEST APERTURE.

1089

00:57:09,560 --> 00:57:13,960

THIS IS ABOUT A METER ACROSS OR

ABOUT A YARD.

1090

00:57:13,960 --> 00:57:17,520

THAT IS WHAT WE TAKE APPROACH
IMAGES WITH AND FOR NAVIGATION.

1091

00:57:17,520 --> 00:57:22,640

WE WILL TAKE PICTURES OF PLUTO
AND THE STARS IN THE BACKGROUND

1092

00:57:22,640 --> 00:57:28,500

AND FIGURE OUT BETTER THAN WE
CAN ON THE GROUND.

1093

00:57:28,500 --> 00:57:32,460

THEN WE ACTUALLY ADJUST THE TIME
OF THE COMMANDS THAT WILL TAKE

1094

00:57:32,460 --> 00:57:35,110

ALL THE OBSERVATIONS SO THEY ARE
SYNCHRONIZED WITH WHERE THE

1095

00:57:35,110 --> 00:57:36,270

SPACECRAFT IS.

1096

00:57:36,270 --> 00:57:40,940

WE'LL ALSO SEND UP AN
INTEMPERATE SO EVERYTHING WILL

1097

00:57:40,940 --> 00:57:46,530

BE IN LOCK STEP WITH THE WAY WE
PLANNED IT.

1098

00:57:46,530 --> 00:57:48,870

YOU CAN ALSO SEE THE STAR
TRACKERS.

1099

00:57:48,870 --> 00:57:53,349

THESE ARE USED FOR ATTITUDE TO
DETERMINE WHERE THE ATTITUDE IS.

1100

00:57:53,349 --> 00:57:55,330

AND THERE'S TWO OF THEM FOR
REDUNDANCY.

1101

00:57:55,330 --> 00:57:58,270

WE ONLY NEED ONE, BUT WE PUT TWO
ON BOARD.

1102

00:57:58,270 --> 00:58:02,670

WE HAVE OUR AUTONOMY SYSTEM,
WHICH WILL SWITCH FROM ONE TO

1103

00:58:02,670 --> 00:58:04,970

THE OTHER IF ONE ISN'T WORKING.

1104

00:58:04,970 --> 00:58:10,040

THAT IS AN IMPORTANT PART OF A
SPACECRAFT THAT'S GOING TO GO BE

1105

00:58:10,040 --> 00:58:11,510

NINE HOURS AWAY.

1106

00:58:11,510 --> 00:58:13,840

IF WE WANTED TO TELL IT TO DO
SOMETHING, WE WOULDN'T KNOW

1107

00:58:13,840 --> 00:58:17,030

WHETHER IT DID IT UNTIL NINE
HOURS WHEN WE GET THE MESSAGE

1108

00:58:17,030 --> 00:58:18,030

BACK.

1109

00:58:18,030 --> 00:58:23,520

SO IT HAS TO TAKE CARE OF ITSELF
AND WHAT IT IS DOING.

1110

00:58:23,520 --> 00:58:35,400

CHECK ON TELEMETRY AND IT
REPORTS BACK.

1111
00:58:35,400 --> 00:58:36,849
NEXT WE WILL GO UP TO THE SUN
SENSOR.

1112
00:58:36,849 --> 00:58:41,110
WE HAVE A MODE OF THE SPACECRAFT
THAT SAYS I'M†-- I DON'T KNOW

1113
00:58:41,110 --> 00:58:42,110
ANYTHING.

1114
00:58:42,110 --> 00:58:43,790
I'M LOST IN SPACE.

1115
00:58:43,790 --> 00:58:47,280
I'M GOING TO POINT TO THE SUN
BECAUSE THE SUN, WHICH YOU'RE SO

1116
00:58:47,280 --> 00:58:49,980
FAR AWAY AT PLUTO, IS VERY CLOSE
TO THE EARTH.

1117
00:58:49,980 --> 00:58:52,610
IF WE POINT TO THE SUN, THE
EARTH WILL BE ABLE TO TALK TO

1118
00:58:52,610 --> 00:58:53,610
THE SPACECRAFT.

1119
00:58:53,610 --> 00:58:55,820
IT'S NOT ACTUALLY BECAUSE WE
NEED POWER FROM THE SUN BUT

1120
00:58:55,820 --> 00:58:59,150
BECAUSE WE WANT TO COMMUNICATE
WITH EARTH.

1121
00:58:59,150 --> 00:59:01,980
SO THAT'S PRETTY MUCH THE TOUR.

1122
00:59:01,980 --> 00:59:05,500
AND I THINK†-- YEAH.

1123
00:59:05,500 --> 00:59:06,680
THAT'S IT.

1124
00:59:06,680 --> 00:59:08,540
SO IF YOU HAVE ANY QUESTIONS.

1125
00:59:08,540 --> 00:59:10,690
>> ANY QUESTIONS ABOUT THE
SPACECRAFT?

1126
00:59:10,690 --> 00:59:11,890
THE FIRST QUESTION IN THE ROOM.

1127
00:59:11,890 --> 00:59:13,690
GO UP HERE.

1128
00:59:13,690 --> 00:59:16,970
>> COULD YOU TALK A BIT MORE
ABOUT THE THRUSTERS AND ABOUT

1129
00:59:16,970 --> 00:59:22,310
THE CHANGING OF MODES FROM SPIN
TO THREE AXIS AND SO ON AND SO

1130
00:59:22,310 --> 00:59:23,310
FORTH?

1131
00:59:23,310 --> 00:59:24,310
>> SURE.

1132
00:59:24,310 --> 00:59:25,310
I COULD USE THE MODELS, I GUESS.

1133

00:59:25,310 --> 00:59:26,310

LET ME DO THIS.

1134

00:59:26,310 --> 00:59:30,080

BECAUSE I ALWAYS LIKE TO†-- I
THINK THIS WILL COME OFF OF

1135

00:59:30,080 --> 00:59:31,080

HERE.

1136

00:59:31,080 --> 00:59:32,880

ACTUALLY, WE CAN SEE THE BOTTOM
TOO.

1137

00:59:32,880 --> 00:59:36,849

BECAUSE THAT'S WHERE THE
PROPELLER TANK IS.

1138

00:59:36,849 --> 00:59:45,280

THERE IS SOME DOWN HERE ON THE
BOTTOM AND SOME ON THE SIDE.

1139

00:59:45,280 --> 00:59:49,180

WHAT THEY DO IS THEY FIRE IN
PAIRS.

1140

00:59:49,180 --> 00:59:53,540

IF WE WANTED TO SPIN THIS WAY,
WE WOULD FIRE ONE HERE AND THEN

1141

00:59:53,540 --> 00:59:55,090

ONE OVER HERE.

1142

00:59:55,090 --> 00:59:59,810

AND THEN†-- THEY ARE POINTED IN
GENERAL†-- LET'S SEE.

1143

00:59:59,810 --> 01:00:02,510

THIS WAY AND THIS WAY, ON THE
TOP AND THE BOTTOM.

1144

01:00:02,510 --> 01:00:05,820
AND THEN THIS WAY AND THIS WAY
ON THE SIDES.

1145

01:00:05,820 --> 01:00:09,300
SO THE ONES THAT ARE ON THE
SIDES, TIP IT THIS WAY.

1146

01:00:09,300 --> 01:00:13,060
AND THE ONES THAT ARE ON THE TOP
AND THE BOTTOM GO THIS WAY AND

1147

01:00:13,060 --> 01:00:14,150
THIS WAY.

1148

01:00:14,150 --> 01:00:16,400
SO YOU GET THREE AXIS CONTROL.

1149

01:00:16,400 --> 01:00:21,940
SO WHEN WE WANT TO SPIN UP, WE
FIRE THE THRUSTERS AND SPIN AT 5

1150

01:00:21,940 --> 01:00:22,940
RPM.

1151

01:00:22,940 --> 01:00:25,790
BECAUSE THAT'S A FAIRLY
STABLE†-- IT'S A TRADE OFF

1152

01:00:25,790 --> 01:00:28,000
BETWEEN†-- THERE'S ALWAYS
TRADEOFFS.

1153

01:00:28,000 --> 01:00:29,599
IT TAKES FULL TO SPIN OFF.

1154

01:00:29,599 --> 01:00:31,610
THE FAVORITE YOU SPIN THE MORE
STABLE YOU ARE.

1155
01:00:31,610 --> 01:00:36,330
WE PROBABLY COULD HAVE GONE
SLOWER BUT WE BUDGETED FOR 5

1156
01:00:36,330 --> 01:00:37,330
RPM.

1157
01:00:37,330 --> 01:00:45,300
ONCE YOU BUDGET EVERYTHING, YOU
DON'T WANT TO CHANGE ANYTHING.

1158
01:00:45,300 --> 01:00:48,340
THERE'S TWO THRUSTERS POINTING
STRAIGHT DOWN OUT OF THE BOTTOM.

1159
01:00:48,340 --> 01:00:52,340
THOSE ARE THE ONES WE DO TO USE
THE MANEUVER AFTER PLUTO WHEN WE

1160
01:00:52,340 --> 01:00:53,770
GO TO THE KUIPER BELT.

1161
01:00:53,770 --> 01:00:57,609
THEY ARE LIKE FIVE TIMES AS BIG.

1162
01:00:57,609 --> 01:01:04,690
AND THEN WHEN WE DO THAT, WE
ALSO USE THE OTHER THRUSTERS TO

1163
01:01:04,690 --> 01:01:08,320
CONTROL THE POINTING AS WE'RE
THRUSTING.

1164
01:01:08,320 --> 01:01:12,359
ONE OTHER NEAT THING, WE ONLY
USE TWO THRUSTERS AT A TIME.

1165

01:01:12,359 --> 01:01:14,619

THRUSTERS TAKE A LOT OF ENERGY.

1166

01:01:14,619 --> 01:01:18,430

WE WANT TO STAY UNDER THAT 200
WATTS OF POWER.

1167

01:01:18,430 --> 01:01:22,140

SO WE ONLY OPERATE TWO THRUSTERS
AT A TIME EXCEPT WHEN WE DO A

1168

01:01:22,140 --> 01:01:26,000

DELTA V, AND THEN WE CAN DO 4.

1169

01:01:26,000 --> 01:01:27,520

HYDROZINE.

1170

01:01:27,520 --> 01:01:31,290

>> NEXT QUESTION COMES FROM
LOWELL OBSERVATORY.

1171

01:01:31,290 --> 01:01:32,290

LOWELL?

1172

01:01:32,290 --> 01:01:39,349

>> HOW IS THE USE OF RTGs ON NEW
HORIZONS CHANGE THE ATTITUDE,

1173

01:01:39,349 --> 01:01:45,740

POLITICAL OR OTHERWISE, OF
UTILIZING RADIOACTIVE MATERIAL

1174

01:01:45,740 --> 01:01:50,510

FOR POWER SYSTEMS, FOR DEEP
SPACE MISSIONS IN THANK YOU.

1175

01:01:50,510 --> 01:01:56,320

>> THAT WOULD BE A MORE PROGRAM

ATTIC QUESTION.

1176

01:01:56,320 --> 01:02:01,491

THERE WASN'T MUCH RESISTANCE FOR
NEW HORIZONS BECAUSE IT WAS A

1177

01:02:01,491 --> 01:02:03,680

DIRECT LAUNCH INTO SPACE.

1178

01:02:03,680 --> 01:02:06,310

SO THERE WEREN'T ANY FLY-BYS.

1179

01:02:06,310 --> 01:02:14,339

IT HAD NO OTHER RADIO ISOTOPE
HEATER UNITS.

1180

01:02:14,339 --> 01:02:17,640

SO THE ANALYSIS FOR THE SAFETY
WAS VERY STRAIGHTFORWARD AND

1181

01:02:17,640 --> 01:02:18,640

SIMPLE.

1182

01:02:18,640 --> 01:02:20,750

AND WE MADE A CONSCIOUS DECISION
TO DO THAT BECAUSE WE HAD A

1183

01:02:20,750 --> 01:02:22,030

SHORT SCHEDULE.

1184

01:02:22,030 --> 01:02:27,160

SO WE WERE LAUNCHING A POWER
SOURCE THAT HAD ALREADY FLOWN,

1185

01:02:27,160 --> 01:02:36,040

ALREADY IN THIS CONFIGURATION
SIMILAR TO ULYSSES.

1186

01:02:36,040 --> 01:02:42,980

I THINK WE WOULD HAVE TO POLL
THE AUDIENCE OR THE PUBLIC TO

1187

01:02:42,980 --> 01:02:46,690

SEE HOW IT HAS CHANGED THEIR
PERCEPTION.

1188

01:02:46,690 --> 01:02:51,100

BUT I NEVER HAD ANY CONCERNS
ABOUT THE LAUNCHING OF THE POWER

1189

01:02:51,100 --> 01:02:52,100

SOURCE.

1190

01:02:52,100 --> 01:02:53,100

>> WONDERFUL.

1191

01:02:53,100 --> 01:02:57,670

JUST A REMINDER WE'RE TAKING
QUESTIONS USING #ASKNASA.

1192

01:02:57,670 --> 01:03:04,670

HOW LONG WOULD NEW HORIZONS LAST
IN SPACE?

1193

01:03:04,670 --> 01:03:05,880

>> THAT'S A GOOD QUESTION.

1194

01:03:05,880 --> 01:03:12,280

AND IT DEPENDS ON WHAT THINGS
COULD GO WRONG FIRST.

1195

01:03:12,280 --> 01:03:15,820

OR IF THINGS GO RIGHT.

1196

01:03:15,820 --> 01:03:20,990

THERE ARE THINGS YOU CAN DO THAT
TAKE ON MORE RISK.

1197

01:03:20,990 --> 01:03:24,700
AS YOU MENTIONED ABOUT THE
PROPULSION SYSTEM AND THE

1198

01:03:24,700 --> 01:03:29,170
THRUSTERS, AS WE START LOSING
POWER FROM THE RTG, IT STARTS TO

1199

01:03:29,170 --> 01:03:31,619
DECAY AND GO DOWN.

1200

01:03:31,619 --> 01:03:34,140
YOU THINK ABOUT†-- WHAT CAN WE
SHUT OFF?

1201

01:03:34,140 --> 01:03:36,010
WHAT DON'T WE NEED?

1202

01:03:36,010 --> 01:03:40,080
THERE ARE WAYS TO OPERATE THE
SPACECRAFT WITH LESS THRUSTERS.

1203

01:03:40,080 --> 01:03:41,850
AND YOU COULD ALLOW THEM TO GET
COLDER.

1204

01:03:41,850 --> 01:03:45,090
AND THE TEMPERATURE YOU COULD
ALLOW TO GET COLDER.

1205

01:03:45,090 --> 01:03:47,540
AS YOU DO, YOU TAKE ON MORE
RISK.

1206

01:03:47,540 --> 01:03:53,940
WE HAVE CALCULATED THAT IF ALL
THINGS GO WELL, WE CAN

1207

01:03:53,940 --> 01:03:59,980
CONFIDENTLY MAINTAIN UNTIL THE

MID 30s.

1208

01:03:59,980 --> 01:04:02,619

2030s.

1209

01:04:02,619 --> 01:04:06,300

BUT IF YOU ASK ME AND SAID I WAS
BETTING, I THINK WE COULD GO

1210

01:04:06,300 --> 01:04:08,490

LONGER THAN THAT.

1211

01:04:08,490 --> 01:04:14,140

WE HAD TO KIND OF ESTIMATE
WHAT'S A RELIABLE MISSION LIFE

1212

01:04:14,140 --> 01:04:16,940

AND CALCULATE THE DECAY AND THE
RTG.

1213

01:04:16,940 --> 01:04:18,810

AND WE CAME UP WITH THE MID
2030s.

1214

01:04:18,810 --> 01:04:20,440

>> ALL RIGHT.

1215

01:04:20,440 --> 01:04:25,359

NEXT QUESTION FROM IN THE ROOM.

1216

01:04:25,359 --> 01:04:37,849

>> TO FOLLOW-UP ON WHAT YOU JUST
SAID ABOUT THE 2030s, AND THEN

1217

01:04:37,849 --> 01:04:41,280

EARLIER ALAN TALKED ABOUT THE
DECISION ABOUT GOING WHICH

1218

01:04:41,280 --> 01:04:44,600

DIRECTION, LET'S SAY THAT IT
LASTS BEYOND 2030.

1219

01:04:44,600 --> 01:04:51,500

IS THERE ANY FUTURE PLANS BEYOND
THE NEXT VENTURE FOR NEW

1220

01:04:51,500 --> 01:04:52,500

HORIZONS?

1221

01:04:52,500 --> 01:04:53,500

>> YEAH, THERE IS, ACTUALLY.

1222

01:04:53,500 --> 01:04:55,220

SOME FUTURE PLANS.

1223

01:04:55,220 --> 01:04:58,930

BUT OF COURSE THEY CAN'T BE
DECIDED ON UNTIL THERE'S FUNDING

1224

01:04:58,930 --> 01:04:59,990

AND ALL OF THAT.

1225

01:04:59,990 --> 01:05:03,839

SO FROM AN ENGINEERING
SCIENTIFIC, THE ADVANTAGE OF

1226

01:05:03,839 --> 01:05:07,530

GOING LONGER IS THAT YOU CAN
TAKE THE MEASUREMENTS FROM THE

1227

01:05:07,530 --> 01:05:12,740

PARTICLES AND INSTRUMENTS AND
MEASURE THE INTERACTION BETWEEN

1228

01:05:12,740 --> 01:05:18,650

THE HELIOSPHERE AND THE GALACTIC
MEDIUM.

1229

01:05:18,650 --> 01:05:23,450
RIGHT NOW VOYAGER HAS
TRANSFERRED INTO OUT BEYOND THE

1230
01:05:23,450 --> 01:05:24,450
HELIOSPHERE.

1231
01:05:24,450 --> 01:05:28,500
AND THE INTERACTIONS THEY
DISCOVERED IN THAT BOUNDARY WAS

1232
01:05:28,500 --> 01:05:29,760
VERY SURPRISING.

1233
01:05:29,760 --> 01:05:34,160
SO WE WOULD ACTUALLY BE ABLE TO
MAKE ANOTHER MEASUREMENT IN

1234
01:05:34,160 --> 01:05:38,750
ANOTHER PART OF THE H HE
LIOSPHERE AND SEE THAT

1235
01:05:38,750 --> 01:05:42,670
TRANSITION INTO OUTER SPACE YOU
WOULD CALL IT.

1236
01:05:42,670 --> 01:05:47,090
IT'S BEYOND THE SOLAR INFLUENCE.

1237
01:05:47,090 --> 01:05:51,660
>> NEXT QUESTION COMES FROM LOBE
OBSERVATORY.

1238
01:05:51,660 --> 01:05:53,490
>> HI.

1239
01:05:53,490 --> 01:06:02,670
MY NAME IS NATALIE FELDER.

1240

01:06:02,670 --> 01:06:04,750
MY QUESTION IS, WHAT IS THE
EXTERIOR BODY CONSTRUCTED OF TO

1241

01:06:04,750 --> 01:06:05,750
WITHSTAND THE PRESSURE AND
VACUUM OF DEEP SPACE AND HOW

1242

01:06:05,750 --> 01:06:06,750
VULNERABLE IS IT TO THE ELEMENTS
OF THE UNKNOWN, SO TO SPEAK?

1243

01:06:06,750 --> 01:06:08,740
>> THE VACUUM IS NOT A PROBLEM
BECAUSE THERE ARE VENTS THAT LET

1244

01:06:08,740 --> 01:06:09,740
THE AIR OUT.

1245

01:06:09,740 --> 01:06:16,330
SO THAT'S NOT A PROBLEM.

1246

01:06:16,330 --> 01:06:23,920
BUT FOR THE PROTECTING AGAINST
MICRO METEOROIDS, WE TOOK THE

1247

01:06:23,920 --> 01:06:28,280
THERMAL BLANKETS AND PUT
STANDOFFS ALL AROUND, LIKE

1248

01:06:28,280 --> 01:06:34,790
LITTLE TOOTHPICKS TO RAISE THE
BLANKETS A LITTLE BIT BIGGER.

1249

01:06:34,790 --> 01:06:37,920
SO WHEN YOU SAW THE SPACECRAFT
WITH THE BLANKETS, THEY'RE NOT

1250

01:06:37,920 --> 01:06:39,599
PRESSED RIGHT AGAINST THE

SPACECRAFT.

1251

01:06:39,599 --> 01:06:46,210

THEY ARE STOOD OFF LIKE A BUMPER
FOR THE VERY SMALL PARTICLES

1252

01:06:46,210 --> 01:06:51,190

THAT MIGHT BE IN SPACE TO ALLOW
THEM TO HIT SOMETHING AND

1253

01:06:51,190 --> 01:06:56,420

DISBURSE SO THEY WON'T PENETRATE
THE SURFACE OF THE SPACECRAFT.

1254

01:06:56,420 --> 01:07:02,100

AND THEN WE ALSO PUT A VERY
DENSE LAYER OF KEVLAR IN THE

1255

01:07:02,100 --> 01:07:03,100

BLANKET.

1256

01:07:03,100 --> 01:07:06,460

SO WE HAVE THE THERMAL BLANKETS,
BUT WE ALSO HAVE A LAYER INSIDE

1257

01:07:06,460 --> 01:07:09,140

OF THERE THAT'S REALLY STRONG.

1258

01:07:09,140 --> 01:07:13,440

IT WON'T STOP THE PARTICLE FROM
GETTING THROUGH THAT BLANKET.

1259

01:07:13,440 --> 01:07:17,589

BUT WHAT IT WILL DO IS BREAK IT
UP SO WHEN IT DOES HIT THE DECK

1260

01:07:17,589 --> 01:07:19,020

OF THE SPACECRAFT IT WON'T
PENETRATE.

1261

01:07:19,020 --> 01:07:21,780

IT WILL JUST MAKE AN
INDENTATION.

1262

01:07:21,780 --> 01:07:25,400

THAT'S HOW WE DESIGNED THE
SPACECRAFT FOR THAT.

1263

01:07:25,400 --> 01:07:26,400

>> ALL RIGHT.

1264

01:07:26,400 --> 01:07:27,860

NEXT QUESTION IN THE ROOM HERE.

1265

01:07:27,860 --> 01:07:30,830

>> THANK YOU, LOWELL FOR THAT
LAST QUESTION.

1266

01:07:30,830 --> 01:07:32,020

PERFECT SEGUE.

1267

01:07:32,020 --> 01:07:33,150

HOW IS THAT A TEST?

1268

01:07:33,150 --> 01:07:36,610

IT LOOKS SO THIN?

1269

01:07:36,610 --> 01:07:38,000

LIKE TAPE.

1270

01:07:38,000 --> 01:07:42,200

>> THEY HAD I BELIEVE IT'S
VELCROED.

1271

01:07:42,200 --> 01:07:46,859

ONE THING WE DID IN OUR TESTING
IS WE HAD TO BE VERY ACCURATE

1272

01:07:46,859 --> 01:07:51,860
ABOUT HOW MUCH HEAT WAS LEAKING
OUT OF THE SPACECRAFT.

1273
01:07:51,860 --> 01:07:56,050
SO IN ORDER TO PROVE THAT WE
COULD DO THAT, WE ACTUALLY HAD

1274
01:07:56,050 --> 01:07:59,680
TO PUT THE BLANKETS ON, TEST IT
IN A THERMAL VACUUM, TAKE THE

1275
01:07:59,680 --> 01:08:03,401
BLANKETS OFF AND THEN PUT THEM
BACK ON AGAIN AND MAKE SURE IT

1276
01:08:03,401 --> 01:08:04,401
WAS THE SAME.

1277
01:08:04,401 --> 01:08:06,520
SO WHEN WE PUT IT BACK ON THE
LAST TIME WE COULD HAVE

1278
01:08:06,520 --> 01:08:09,500
CONFIDENCE THAT IT WAS GOING TO
BE THE SAME.

1279
01:08:09,500 --> 01:08:11,930
I BELIEVE IT'S VELCRO AND TAPE.

1280
01:08:11,930 --> 01:08:17,290
AND THEN THE STAND OFFS HAVE
LIKE A WASHER OR SOMETHING THAT

1281
01:08:17,290 --> 01:08:21,650
HOLDS IT UP AND THEN IT'S FAS
ESPECIALLED ON THE TOP.

1282
01:08:21,650 --> 01:08:27,339
BUT WE HAVE AMAZING THERMAL

ENGINEERS THAT WILL SEW THESE

1283

01:08:27,339 --> 01:08:28,339

BLANKETS.

1284

01:08:28,339 --> 01:08:29,690

IT IS REALLY QUITE AN OPERATION.

1285

01:08:29,690 --> 01:08:31,650

THEY HAVE A WHOLE MODEL ON THE
SPACECRAFT.

1286

01:08:31,650 --> 01:08:34,420

THEY BUILD IT ON THE MODEL AND
THEN THEY HAVE TO PIECE IT OFF

1287

01:08:34,420 --> 01:08:36,670

LIKE A DRESS.

1288

01:08:36,670 --> 01:08:41,289

>> THE LAST QUESTION COMES FROM
LOWELL.

1289

01:08:41,289 --> 01:08:43,569

>> ALY McGRAW HERE.

1290

01:08:43,569 --> 01:08:45,099

SPACECRAFT JITTER.

1291

01:08:45,099 --> 01:08:55,769

DO YOU EXPECT TO SEE ANY JITTER
OR ARE THEY DESIGNED TO BE ON

1292

01:08:55,769 --> 01:08:57,669

THE SPACECRAFT?

1293

01:08:57,669 --> 01:09:02,440

>> WE TRY TO AVOID MOVING PARTS
WHEREVER POSSIBLE TO INCREASE

1294

01:09:02,440 --> 01:09:04,099

THE RELIABILITY OF THE
SPACECRAFT.

1295

01:09:04,099 --> 01:09:08,119

SO THERE'S REALLY NOTHING ON
BOARD THAT HAS BEEN MOVED.

1296

01:09:08,119 --> 01:09:12,469

THE STUDENT DESK COUNTER IS ONE
THAT CAN MEASURE VERY FINE

1297

01:09:12,469 --> 01:09:15,389

DISTURBANCES.

1298

01:09:15,389 --> 01:09:19,989

BECAUSE IT IS INTENDED TO
MEASURE AT A VERY SMALL IMPACT

1299

01:09:19,989 --> 01:09:21,569

ON A DETECTOR.

1300

01:09:21,569 --> 01:09:24,929

BUT IT HAS THE ABILITY TO SET
ITS THRESHOLDS.

1301

01:09:24,929 --> 01:09:27,389

AND THE ONE THING I WAS GOING TO
SAY THAT DOES HAVE MOVING PARTS,

1302

01:09:27,389 --> 01:09:30,549

THERE IS A VALVE INSIDE THE
THRUSTERS.

1303

01:09:30,549 --> 01:09:34,779

SO THE STUDENT DESK COUNTER CAN
DETECT WHEN THE THRUSTERS ARE

1304

01:09:34,779 --> 01:09:35,779

FIRING.

1305

01:09:35,779 --> 01:09:42,449

SO AT PLUTO, IT ACTUALLY HAS TO
RAISE THRESHOLD.

1306

01:09:42,449 --> 01:09:44,699

WHEN WE'RE IN HIBERNATION, WE
DON'T FIRE ANY.

1307

01:09:44,699 --> 01:09:47,150

THEY LOWER THE PRESSURE TO BE
MORE SENSITIVE.

1308

01:09:47,150 --> 01:09:50,849

AT PLUTO, WE WILL BE THRUSTING
AND MANEUVERING AND TAKING

1309

01:09:50,849 --> 01:09:51,889

PICTURES.

1310

01:09:51,889 --> 01:09:56,639

THAT ACTUALLY CAUSES SLIGHT
DISTURBANCES ON THE SPACECRAFT.

1311

01:09:56,639 --> 01:10:00,800

BUT THERE REALLY IS NO JITTER AS
FAR AS THE IMAGES ARE CONCERNED.

1312

01:10:00,800 --> 01:10:04,219

ONLY THE MOTION OF THE
SPACECRAFT AND THE ATTITUDE

1313

01:10:04,219 --> 01:10:05,710

CONTROL.

1314

01:10:05,710 --> 01:10:06,710

>> ALL RIGHT.

1315

01:10:06,710 --> 01:10:08,499

THANK YOU VERY MUCH, CHRIS, FOR
LETTING US KNOW ABOUT THE

1316

01:10:08,499 --> 01:10:09,659

SPACECRAFT.

1317

01:10:09,659 --> 01:10:10,820

DEFINITELY.

1318

01:10:10,820 --> 01:10:14,300

[APPLAUSE].

ALL RIGHT.

1319

01:10:14,300 --> 01:10:18,539

UP NEXT FROM NASA'S RESEARCH
CENTER IS KIM ENNICO, HERE TO

1320

01:10:18,539 --> 01:10:21,139

TELL US A LITTLE BIT ABOUT WHAT
IT'S LIKE TO BE ON THE TEAM AND

1321

01:10:21,139 --> 01:10:25,349

PREPARATIONS THEY'RE MAKING FOR
THE JULY 14th FLY-BY OF PLUTO.

1322

01:10:25,349 --> 01:10:26,349

SO, KIM?

1323

01:10:26,349 --> 01:10:27,349

>> ALL RIGHT.

1324

01:10:27,349 --> 01:10:34,909

SO BEING A NASA SOCIAL, I WANT
TO CONVEY TO YOU A DAY IN THE

1325

01:10:34,909 --> 01:10:37,590

LIFE OF WHAT'S GOING ON RIGHT
NOW.

1326

01:10:37,590 --> 01:10:43,039

WE ARE 37 DAYS FROM CLOSEST
APPROACH.

1327

01:10:43,039 --> 01:10:45,989

WE ARE IN DAY OF YEAR 157.

1328

01:10:45,989 --> 01:10:48,719

AND A LOT OF TIMES THESE NUMBERS
AND DATES ARE IN MY HEAD.

1329

01:10:48,719 --> 01:10:52,780

BECAUSE IN THE COURSE OF A
SINGLE DAY I MAY BE THINKING

1330

01:10:52,780 --> 01:10:58,090

ABOUT SOMETHING THAT WAS MONTHS
AGO, WEEKS AGO, THIS MORNING,

1331

01:10:58,090 --> 01:11:02,099

TOMORROW, NEXT WEEK, AND THE
NEXT YEAR.

1332

01:11:02,099 --> 01:11:03,500

SO DOING THIS JUGGLING.

1333

01:11:03,500 --> 01:11:07,920

SO I JUST WANT TO GIVE YOU A
SENSE OF A DAY IN THE LIFE OF

1334

01:11:07,920 --> 01:11:10,800

THE OPERATIONS.

1335

01:11:10,800 --> 01:11:11,920

THE MISSION IS LONG.

1336

01:11:11,920 --> 01:11:13,039

NINE AND A HALF YEARS.

1337

01:11:13,039 --> 01:11:14,550
LAUNCHED IN 2006.

1338

01:11:14,550 --> 01:11:20,310
GETS TO BLUE JULY 14th, 2015,
NINE AND A HALF YEARS.

1339

01:11:20,310 --> 01:11:24,770
IT ISN'T YOU LAUNCH IT, PUT IT
TO SLEEP AND FORGET IT ABOUT IT

1340

01:11:24,770 --> 01:11:26,019
FOR NINE YEARS.

1341

01:11:26,019 --> 01:11:30,789
WHAT THIS REPRESENTS HERE IS
SEVEN YEARS OF THE MISSION

1342

01:11:30,789 --> 01:11:35,400
SCRUNCHED DOWN INTO A SLIDE,
COLOR CODING TIMES FROM LEFT TO

1343

01:11:35,400 --> 01:11:38,199
RIGHT, THE DIFFERENT PERIODS OF
ACTIVITIES.

1344

01:11:38,199 --> 01:11:42,000
TYPICALLY AFTER LAUNCH
INSTRUMENT CHECKOUT THE JUPITER

1345

01:11:42,000 --> 01:11:46,309
FLY-BY WHICH OCCURRED A YEAR AND
A HALF AFTER LAUNCH WENT INTO

1346

01:11:46,309 --> 01:11:48,119
THIS CRUISE MODE.

1347

01:11:48,119 --> 01:11:51,969

DURING THE COURSE OF THE CRUISE
MODE, THE INSTRUMENTS WOULD GO

1348

01:11:51,969 --> 01:11:55,999
TO SLEEP FOR SEVERAL MONTHS OF
THE YEAR AND WAKE UP ABOUT TWICE

1349

01:11:55,999 --> 01:12:00,010
A YEAR FOR WHICH WE WOULD DO
CALIBRATIONS.

1350

01:12:00,010 --> 01:12:01,809
SEE IF EVERYTHING IS FINE.

1351

01:12:01,809 --> 01:12:04,739
CHECKING WHETHER THE
TEMPERATURES WERE WORKING WELL.

1352

01:12:04,739 --> 01:12:09,650
THIS HAS BEEN THE COURSE OF
ACTION FOR THE LAST SEVEN YEARS.

1353

01:12:09,650 --> 01:12:14,360
THE COLORS REPRESENT-- PURPLE
IS WHEN IT'S IN SPIN MODE, WHICH

1354

01:12:14,360 --> 01:12:17,340
CHRIS ALLUDED TO.

1355

01:12:17,340 --> 01:12:20,650
IT GIVES US STABILIZATION FOR
THE ANTENNA POINTED AT EARTH

1356

01:12:20,650 --> 01:12:22,099
SAVES ON FUEL.

1357

01:12:22,099 --> 01:12:24,040
WE'RE NOT TAKING ANY PICTURES
THEN.

1358

01:12:24,040 --> 01:12:29,340

THOSE YELLOW PERIODS HERE, SURE,
JUST A WEEK HERE, WEEK THERE

1359

01:12:29,340 --> 01:12:30,670

TWICE A YEAR.

1360

01:12:30,670 --> 01:12:34,349

THAT'S WHEN WE GO TO THREE AXIS
MODE TO DO SOME OBSERVATIONS.

1361

01:12:34,349 --> 01:12:39,289

WE GO TO THE NEXT SLIDE.
2015.

1362

01:12:39,289 --> 01:12:41,280

OUR ENCOUNTER STARTED IN
JANUARY.

1363

01:12:41,280 --> 01:12:44,469

YES, JULY 14th IS GOING TO BE
THE DAY.

1364

01:12:44,469 --> 01:12:46,320

BUT OUR TEAM IS REALLY BUSY
RIGHT NOW.

1365

01:12:46,320 --> 01:12:49,250

IN FACT, IT'S VERY BUSY RIGHT
NOW.

1366

01:12:49,250 --> 01:12:54,079

AND I'VE INDICATED A RED LINE
WHERE JUNE 6.

1367

01:12:54,079 --> 01:12:56,849

P MINUS 38.

1368

01:12:56,849 --> 01:13:01,570

BLUE MINUS 38 DAYS.

1369

01:13:01,570 --> 01:13:05,570

WE WOKE OFF HIBERNATION DECEMBER
OF LAST YEAR, WENT INTO THREE

1370

01:13:05,570 --> 01:13:11,360

AXIS MODE, AND STARTED A SERIES
OF OPTICAL NAVIGATION USING THE

1371

01:13:11,360 --> 01:13:15,280

INSTRUMENT TO LOOK AT PLUTO,
KAREN, AND NIX AND HYDRA WITH

1372

01:13:15,280 --> 01:13:19,910

TWO DIFFERENT MODES AND MEASURE
PRECISELY WHERE WE'RE POINTED.

1373

01:13:19,910 --> 01:13:23,900

WE USED THAT INFORMATION AND DID
A CORRECTION MANEUVER A FEW

1374

01:13:23,900 --> 01:13:24,900

MONTHS AGO.

1375

01:13:24,900 --> 01:13:29,979

AND WE ARE PLANNING THE NEXT
MANEUVER ON JUNE 15th.

1376

01:13:29,979 --> 01:13:33,389

HOWEVER, THAT'S NOT CERTAIN,
BECAUSE THE TEAM TODAY IS

1377

01:13:33,389 --> 01:13:37,449

LOOKING AT DATA THAT WAS TAKEN
THREE DAYS AGO THAT GOT BROUGHT

1378

01:13:37,449 --> 01:13:38,449

DOWN TODAY.

1379

01:13:38,449 --> 01:13:43,860

THEY'RE LOOKING AT IT, ANALYZING
IT AND A DECISION WILL BE MADE

1380

01:13:43,860 --> 01:13:47,389

ON MONDAY WHETHER OR NOT WE'RE
GOING TO GO AHEAD WITH THE BURN

1381

01:13:47,389 --> 01:13:48,510

IN A COUPLE OF DAYS.

1382

01:13:48,510 --> 01:13:52,090

SO IT'S VERY BUSY RIGHT NOW JUST
TO GIVE YOU A SENSE.

1383

01:13:52,090 --> 01:13:57,429

WHEN WE GET TO JULY 14th, A
COUPLE DAYS BEFORE THE BAR TURNS

1384

01:13:57,429 --> 01:13:58,690

ORANGE.

1385

01:13:58,690 --> 01:14:02,010

THAT'S JUST AN INDICATION THAT
WE HAVE PUT THE SPACECRAFT INTO

1386

01:14:02,010 --> 01:14:05,690

A PARTICULAR MODE CALLED
"ENCOUNTER MODE."

1387

01:14:05,690 --> 01:14:11,619

WHERE AUTONOMY WILL REBOOT THE
COMMANDER IN CASE WE HAVE A DATA

1388

01:14:11,619 --> 01:14:14,880

IN COMMAND EVENT FAILURE.

1389

01:14:14,880 --> 01:14:20,880

WE CAN'T WAIT FOR THE SPACECRAFT

TO GO SAFE.

1390

01:14:20,880 --> 01:14:26,849

WE TESTED IT DURING REHEARSAL A
YEAR AND A HALF AGO BECAUSE WE

1391

01:14:26,849 --> 01:14:30,840

WANTED TO MAKE SURE THAT THE
SPACECRAFT-- THAT ALL THE

1392

01:14:30,840 --> 01:14:33,239

SYSTEMS ON SPACECRAFT WOULD
EXECUTE.

1393

01:14:33,239 --> 01:14:37,050

SO DOING A FULL REHEARSAL OF
WHAT WE WILL BE DOING WITH THE

1394

01:14:37,050 --> 01:14:40,929

SPACECRAFT THIS SUMMER, THIS
JULY, TWO CAREERS AGO RETIRED A

1395

01:14:40,929 --> 01:14:45,389

LOT OF UNCERTAINTIES HOW THE
ACTUAL SPACECRAFT WILL BEHAVE.

1396

01:14:45,389 --> 01:14:49,020

GO TO THE NEXT SLIDE.

1397

01:14:49,020 --> 01:14:50,949

I WANT TO POINT THIS OUT.

1398

01:14:50,949 --> 01:14:54,829

IF EVERYONE DOESN'T KNOW ABOUT
THIS AMAZING SITE, EYES ON

1399

01:14:54,829 --> 01:14:57,909

NASA.GOV.

1400

01:14:57,909 --> 01:15:05,530
THIS IS A SCREEN GRAB OF APRIL
WHEN WE DID A TEST SIMULATING

1401
01:15:05,530 --> 01:15:10,010
THE GROUND SUPPORT WE NEEDED FOR
A PARTICULAR TYPE OF EXPERIMENT

1402
01:15:10,010 --> 01:15:12,389
THAT WE'RE GOING TO DO DURING
THE PLUTO AND KAREN

1403
01:15:12,389 --> 01:15:16,059
OCCULTATIONS.

1404
01:15:16,059 --> 01:15:24,160
WHAT YOU SEE HERE IS THIS IS
MADRID, GOLD STONE AND CON

1405
01:15:24,160 --> 01:15:25,160
BERRA.

1406
01:15:25,160 --> 01:15:27,749
WE HAD FIVE ANTENNAS IN USE.

1407
01:15:27,749 --> 01:15:31,010
NOW WE SWITCHED TO LIVE.

1408
01:15:31,010 --> 01:15:38,679
AND I WANT TO POINT OUT IF YOU
GO TO IT RIGHT NOW, YOU WILL SEE

1409
01:15:38,679 --> 01:15:41,429
WE ARE ACTUALLY TALKING TO
CANBERRA.

1410
01:15:41,429 --> 01:15:42,630
OUR CALL SIGN IS NHPC.

1411

01:15:42,630 --> 01:15:46,719
THIS IS 70 METER, THE LARGER
DISH.

1412
01:15:46,719 --> 01:15:48,709
THESE ARE 34 METERS.

1413
01:15:48,709 --> 01:15:52,929
TODAY WE ARE DOWNLOADING DATA
THAT WE TOOK THE LAST COUPLE OF

1414
01:15:52,929 --> 01:15:53,929
DAYS.

1415
01:15:53,929 --> 01:15:57,239
IN FACT, TODAY'S DATA WAS
EARLIER IN THE MORNING, OPTICAL

1416
01:15:57,239 --> 01:15:58,239
NAVIGATION.

1417
01:15:58,239 --> 01:16:01,739
RIGHT NOW WE ARE GETTING DOWN
HAZARD DATA.

1418
01:16:01,739 --> 01:16:04,249
WE CALL IT MOON SEARCH DATA,
HAZARD DATA.

1419
01:16:04,249 --> 01:16:07,900
WE HAVE STRATEGICALLY LOOKING AT
THE PLUTO SYSTEM, LOOKING FOR

1420
01:16:07,900 --> 01:16:12,400
MOONS TO INFORM THE PROJECT
WHETHER OR NOT WE NEED TO MAKE A

1421
01:16:12,400 --> 01:16:14,420
COURSE CORRECTION.

1422

01:16:14,420 --> 01:16:16,620

WE HAVEN'T SEEN ANYTHING TO
DATE, BUT WE ARE STILL TAKING

1423

01:16:16,620 --> 01:16:17,670

THESE LOOKS.

1424

01:16:17,670 --> 01:16:20,500

WE HAVE SPECIFIC TIMES AND
TIMELINES AND WE CAN MAKE A

1425

01:16:20,500 --> 01:16:25,329

DECISION TO GO TO A SLIGHTLY
DIFFERENT TRAJECTORY OR SPACE

1426

01:16:25,329 --> 01:16:27,559

GRIP ATTITUDE.

1427

01:16:27,559 --> 01:16:31,510

WE ARE SHOWING YOU THE LATEST
IMAGES FROM THE LORI CAMERA

1428

01:16:31,510 --> 01:16:36,440

POSTING ON THE WEBSITE.

1429

01:16:36,440 --> 01:16:38,920

GO TO THE MAIN WEBSITE.

1430

01:16:38,920 --> 01:16:40,960

THERE'S THIS LITTLE CAMERA ICON.

1431

01:16:40,960 --> 01:16:42,929

IT WILL SHOW YOU THE LORI
IMAGES.

1432

01:16:42,929 --> 01:16:43,980

AND HERE'S ONE.

1433

01:16:43,980 --> 01:16:45,130
THIS IS A SCREEN GRAB.

1434
01:16:45,130 --> 01:16:48,309
BUT IF YOU LOOK RIGHT NOW YOU
WILL SEE IT IS DATA TAKEN FROM

1435
01:16:48,309 --> 01:16:52,619
JUNE 6th SHOWING THERE RIGHT
NOW.

1436
01:16:52,619 --> 01:16:54,330
THEY ARE SHOWING YOU THE SYSTEM.

1437
01:16:54,330 --> 01:16:58,159
AND YOU CAN LOOK ON THE
THUMBNAI LS AND FOLLOW ALONG.

1438
01:16:58,159 --> 01:17:01,699
MY MESSAGE IS WE ARE NOT WAITING
UNTIL JULY 14th.

1439
01:17:01,699 --> 01:17:04,709
JULY 14th IS GOING TO BE EPIC.

1440
01:17:04,709 --> 01:17:07,800
THE SPACECRAFTST GOING TO BE
BUSY TAKING PICTURES OF PLUTO.

1441
01:17:07,800 --> 01:17:09,229
WE'RE GOING TO BE SITTING BACK
AND WAITING.

1442
01:17:09,229 --> 01:17:14,959
BUT RIGHT NOW WE'RE ACTUALLY
TAKING SOME NEW DATA THAT IS

1443
01:17:14,959 --> 01:17:17,030
COMMUNICATING WITH THE
SPACECRAFT AND DOING LOTS OF

1444

01:17:17,030 --> 01:17:18,949

DECISION MAKING RIGHT NOW.

1445

01:17:18,949 --> 01:17:20,360

WE CAN MOVE ON.

1446

01:17:20,360 --> 01:17:23,400

TO GIVE YOU A GLIMPSE THAT WILL
GIVE YOU A SENSE IN THE CURRENT

1447

01:17:23,400 --> 01:17:26,440

DAY RIGHT NOW IN MY LIFE AND
ALSO THE LIFE OF THE TEAM,

1448

01:17:26,440 --> 01:17:29,630

BECAUSE I DO WANT TO QUOTE ONE
OF MY HEROES, EMMETT FROM THE

1449

01:17:29,630 --> 01:17:30,890

LEGO MOVIE.

1450

01:17:30,890 --> 01:17:32,889

EVERYTHING IS SAW SOME BUT
EVERYTHING IS COOL WHEN YOU'RE

1451

01:17:32,889 --> 01:17:37,480

PART OF A TEAM.

1452

01:17:37,480 --> 01:17:42,159

WE HAVE TO HAVE SO MANY AS WITH
SO MANY DIFFERENT DISCIPLINES

1453

01:17:42,159 --> 01:17:43,889

REVIEWING THE DATA PRODUCTS.

1454

01:17:43,889 --> 01:17:46,809

SO I HAVE HINTED THAT IN THE
COURSE OF A DAY I COULD START MY

1455

01:17:46,809 --> 01:17:50,050

MORNING HAVING A CONVERSATION
TALKING ABOUT SOMETHING WE DID

1456

01:17:50,050 --> 01:17:51,539

THREE MONTHS AGO.

1457

01:17:51,539 --> 01:17:54,489

WE'RE SITTING IN A REVIEW OF
SOMETHING GOING UP TO THE

1458

01:17:54,489 --> 01:17:59,070

SPACECRAFT TWO DAYS FROM NOW, TO
PLANNING THE DOWN LINK OF THE

1459

01:17:59,070 --> 01:18:02,619

DATA THAT'S GOING TO OCCUR OVER
THE NEXT YEAR AND A HALF.

1460

01:18:02,619 --> 01:18:05,800

THIS IS AN EXAMPLE OF A LOAD
THAT WE WERE JUST REVIEWING THAT

1461

01:18:05,800 --> 01:18:12,909

IS FOR THE FLY-BY.

1462

01:18:12,909 --> 01:18:17,059

WHAT YOU SEE HERE IS THIS IS AN
STK IMAGE.

1463

01:18:17,059 --> 01:18:22,199

THE GREEN REPRESENTS THE FIELD
OF VIEW OF THE LORI IMAGEER.

1464

01:18:22,199 --> 01:18:27,130

TO QUOTE ONE OF OUR SEQUENCERS,
WHEN SHE MADE THESE IMAGES SHE

1465

01:18:27,130 --> 01:18:31,150
GOT ALL SAD BECAUSE THEY ARE
GETTING SMALLER AND SMALLER AND

1466
01:18:31,150 --> 01:18:34,750
SMALLER AND SMALLER AS WE GO
FURTHER AND FURTHER AWAY.

1467
01:18:34,750 --> 01:18:36,289
THE ILLUMINATION IS DIFFERENT.

1468
01:18:36,289 --> 01:18:42,219
WE FLY IN WHEN PLUTO AND CHARON
ARE ILLUMINATED.

1469
01:18:42,219 --> 01:18:48,420
THEY BECOME DARKER AND JUST VERY
DIFFERENT WORLDS.

1470
01:18:48,420 --> 01:18:51,869
WE HAVE A SPECIFIC MANY SERIES
OF IMAGES WE ARE GOING TO TAKE.

1471
01:18:51,869 --> 01:18:57,110
LOOKING BAG AT THESE THIN
CRESCENTS TO LOOK FOR DUST.

1472
01:18:57,110 --> 01:18:58,830
WE'RE NOT GOING BACK.

1473
01:18:58,830 --> 01:19:03,830
SO THIS IS SOMETHING THAT WE'RE
PLANNING FOR JULY 21st.

1474
01:19:03,830 --> 01:19:05,739
OKAY.

1475
01:19:05,739 --> 01:19:10,440
AND IT HAD BEEN MENTIONED BEFORE
THAT WE ARE DOWNLOADING DATA

1476

01:19:10,440 --> 01:19:11,460
RIGHT NOW.

1477

01:19:11,460 --> 01:19:13,019
WE'RE IN JUNE.

1478

01:19:13,019 --> 01:19:19,260
AND THE DATA COVERS ALL KINDS OF
SCIENCES.

1479

01:19:19,260 --> 01:19:24,969
WHEN WE GET TO THE ACTUAL JULY
ENCOUNTER, WE HAVE TO FILL UP

1480

01:19:24,969 --> 01:19:28,250
THE RECORDERS AS BEST AS
POSSIBLE.

1481

01:19:28,250 --> 01:19:29,949
WE'RE NOT DOWN LINKING THAT
MUCH.

1482

01:19:29,949 --> 01:19:34,530
BECAUSE EVERY SECOND LOOKING AT
EARTH IS A SECOND NOT LOOKING AT

1483

01:19:34,530 --> 01:19:35,550
PLUTO.

1484

01:19:35,550 --> 01:19:43,420
WHEN YOU PASS THROUGH 50,000
KILOMETERS PER HOUR, YOU WANT TO

1485

01:19:43,420 --> 01:19:46,289
TAKE AS MANY PICTURES AND
SPECTRA AS YOU CAN.

1486

01:19:46,289 --> 01:19:51,719

SO WE JUST FILL UP THE HARD
BANKS.

1487

01:19:51,719 --> 01:19:53,719

WE HAVE A COUPLE SNIPPETS OF
DATA.

1488

01:19:53,719 --> 01:19:58,280

IN AUGUST, GOING OUT FOR A YEAR
AND A HALF, WE'LL BE DOWNLOADING

1489

01:19:58,280 --> 01:20:00,429

THIS DATA.

1490

01:20:00,429 --> 01:20:02,869

I'M INVOLVED IN THE PLANNING FOR
THAT.

1491

01:20:02,869 --> 01:20:06,769

SO IN THE COURSE OF A DAY, I'VE
BEEN THINKING ABOUT THE PAST.

1492

01:20:06,769 --> 01:20:08,039

I'M LOOKING AT DATA.

1493

01:20:08,039 --> 01:20:09,329

DOING SCIENCE.

1494

01:20:09,329 --> 01:20:12,680

I'M HELPING REVIEW WHAT'S GOING
UP TO THE SPACECRAFT IN A

1495

01:20:12,680 --> 01:20:16,679

MONTH'S TIME, WEEK'S TIME, IN A
COUPLE DAYS'S TIME.

1496

01:20:16,679 --> 01:20:18,539

I'M THINKING ABOUT THE FUTURE.

1497

01:20:18,539 --> 01:20:21,300
WE'RE PREPARING FOR THE
ENCOUNTER.

1498
01:20:21,300 --> 01:20:25,840
TODAY WE'RE GETTING DATA FOR THE
HAZARD TEAM.

1499
01:20:25,840 --> 01:20:29,539
THEY ARE ANALYZING THE DATA
RIGHT NOW BECAUSE THEY NEED TO

1500
01:20:29,539 --> 01:20:30,980
MAKE A DECISION ON MONDAY.

1501
01:20:30,980 --> 01:20:36,599
SO IT'S A VERY ACTIVE PERIOD FOR
THE WHOLE TEAM.

1502
01:20:36,599 --> 01:20:41,369
YOU CAN FOLLOW US ALONG BY
LOOKING AT THAT WEBSITE.

1503
01:20:41,369 --> 01:20:46,289
WE'RE NOT TALKING DSN ALL THE
TIME BUT WE DO TALK SEVERAL

1504
01:20:46,289 --> 01:20:49,659
TIMES A WEEK.

1505
01:20:49,659 --> 01:20:53,250
AND ALSO LOOKING AT THE WEBSITE
TO SEE THE LATEST IMAGES FROM

1506
01:20:53,250 --> 01:20:54,250
LORI.

1507
01:20:54,250 --> 01:20:57,429
IT IS A VERY EXCITING TIME RIGHT
NOW.

1508

01:20:57,429 --> 01:20:59,520

AND WE HAVEN'T EVEN MADE IT TO
JULY 14th.

1509

01:20:59,520 --> 01:21:02,349

WE HAVE 37 DAYS TO GO.

1510

01:21:02,349 --> 01:21:04,070

>> ALL RIGHT.

1511

01:21:04,070 --> 01:21:06,639

THANK YOU VERY MUCH, KIM, FOR
SHARING WITH US A LITTLE BIT

1512

01:21:06,639 --> 01:21:08,730

ABOUT WHAT THE DAY IN THE LIFE
OF THE TEAM LOOKS LIKE, HOW YOU

1513

01:21:08,730 --> 01:21:11,989

GUYS ARE GETTING READY FOR THE
PREPARATIONS AND EVERYTHING.

1514

01:21:11,989 --> 01:21:13,840

AND KIM IS ACTIVE ON SOCIAL
MEDIA.

1515

01:21:13,840 --> 01:21:16,380

SHE CAN DEFINITELY ANSWER YOUR
QUESTIONS ON THERE.

1516

01:21:16,380 --> 01:21:17,780

USE THE ASK NASA HASHTAG.

1517

01:21:17,780 --> 01:21:18,780

WONDERFUL.

1518

01:21:18,780 --> 01:21:19,780

ALL RIGHT.

1519

01:21:19,780 --> 01:21:20,780

YEAH.

1520

01:21:20,780 --> 01:21:27,800

SO

NEXT UP IN THE INTEREST OF

1521

01:21:27,800 --> 01:21:32,280

TIME HERE, WE WANT TO GIVE ONE
BIG WAY THAT YOU GUYS CAN GET

1522

01:21:32,280 --> 01:21:34,019

INVOLVED IN FOLLOWING ALONG THE
FLY-BY.

1523

01:21:34,019 --> 01:21:37,459

WE SAW A GLIMPSE OF ALL THE
PLANNING THAT KIM WAS TALKING

1524

01:21:37,459 --> 01:21:39,050

ABOUT AND EVERYTHING.

1525

01:21:39,050 --> 01:21:43,090

AND YOU CAN ACTUALLY SEE WITH
NASA'S EYES ON THE SOLAR SYSTEM

1526

01:21:43,090 --> 01:21:47,449

WITH THE EYES ON PLUTO MODULE A
LITTLE BIT OF HOW YOU TOO CAN

1527

01:21:47,449 --> 01:21:50,309

WATCH AND FOLLOW ALONG DURING
THE ENTIRE FLY-BY SEQUENCE.

1528

01:21:50,309 --> 01:21:54,719

HERE TO TALK A LITTLE BIT MORE
ABOUT IT IS KEVIN HUSSEY FROM

1529

01:21:54,719 --> 01:21:56,940
NASA'S JET PROPULSION
LABORATORY.

1530
01:21:56,940 --> 01:21:57,940
KEVIN?

1531
01:21:57,940 --> 01:21:59,550
>> THANK YOU.

1532
01:21:59,550 --> 01:22:03,099
I MANAGE A GROUP AT THE JET PRO
PUDDLE LABORATORY WHOSE JOB IT

1533
01:22:03,099 --> 01:22:09,230
IS TO VISUALIZE THE DATA THAT
NASA COLLECTS.

1534
01:22:09,230 --> 01:22:12,090
ONE OF THE TOOLS THAT'S ALREADY
BEEN MENTIONED IS NASA'S EYES.

1535
01:22:12,090 --> 01:22:14,380
EYES ON ON NASA.GOV.

1536
01:22:14,380 --> 01:22:18,920
MY OBJECTIVE HERE IN THE NEXT
FEW MINUTES IS TO TRAIN YOU HOW

1537
01:22:18,920 --> 01:22:23,750
TO BECOME VIRTUAL EXPLORERS OF
THE SOLAR SYSTEM USING EYES ON

1538
01:22:23,750 --> 01:22:26,499
NASA.GOV.

1539
01:22:26,499 --> 01:22:31,260
YOU START BY GOING TO THE
WEBSITE.

1540

01:22:31,260 --> 01:22:35,630

WHEN YOU DO YOU WILL SEE A BIG
DOWNLOAD BUTTON.

1541

01:22:35,630 --> 01:22:38,260

WHEN YOU HIT DOWNLOAD, YOU
LITERALLY WILL BE DOWNLOADING

1542

01:22:38,260 --> 01:22:41,360

ESSENTIALLY LIKE A VIDEO GAME.

1543

01:22:41,360 --> 01:22:45,619

WE USE VIDEO GAME TECHNOLOGY TO
ALLOW YOU TO VISUALIZE WHAT IS

1544

01:22:45,619 --> 01:22:47,639

TAKING PLACE IN THE SOLAR
SYSTEM.

1545

01:22:47,639 --> 01:22:50,099

NOW, I'VE ALREADY DONE THAT,
OBVIOUSLY.

1546

01:22:50,099 --> 01:22:51,980

SO I'M GOING TO MINIMIZE THIS.

1547

01:22:51,980 --> 01:22:56,110

ONCE YOU DO DOWNLOAD IT, YOU'LL
GET AN ICON THAT SAYS NASA'S

1548

01:22:56,110 --> 01:22:57,110

EYES.

1549

01:22:57,110 --> 01:22:58,110

BY THE WAY, THIS IS A LIVE
DEMONSTRATION.

1550

01:22:58,110 --> 01:23:00,719

I HAVE BEEN WARNED ABOUT DOING

LIVE DEMONSTRATIONS.

1551

01:23:00,719 --> 01:23:02,380

IT DOESN'T SCARE ME.

1552

01:23:02,380 --> 01:23:05,469

I'M GOING TO DOUBLE CLICK THIS
TO SHOW YOU WHAT IT WILL BE LIKE

1553

01:23:05,469 --> 01:23:08,889

ONCE YOU DOWNLOAD THIS SOFTWARE.

1554

01:23:08,889 --> 01:23:10,760

WE HAVE MANY DIFFERENT PRODUCTS.

1555

01:23:10,760 --> 01:23:12,750

WE HAVE ONE THAT TALKS ABOUT THE
EARTH.

1556

01:23:12,750 --> 01:23:15,099

WE HAVE TWO FOR THE SOLAR
SYSTEM.

1557

01:23:15,099 --> 01:23:19,750

AND WE HAVE ONE FOR EXOPLANETS,
PLANETS DISCOVERED AROUND OTHER

1558

01:23:19,750 --> 01:23:21,239

STARS.

1559

01:23:21,239 --> 01:23:26,679

WE ALSO HAVE THESE LINKS AT THE
BOTTOM WHICH ARE SUBSETS OF EYES

1560

01:23:26,679 --> 01:23:28,179

ON THE SOLAR SYSTEM.

1561

01:23:28,179 --> 01:23:29,179

OKAY.

1562

01:23:29,179 --> 01:23:31,429

ONE OF WHICH IS CALLED EYES ON
PLUTO.

1563

01:23:31,429 --> 01:23:34,340

THAT'S THE ONE I WILL SPEND MOST
OF MY TIME ON TODAY.

1564

01:23:34,340 --> 01:23:37,579

BEFORE I DO, I WANT TO MAKE A
NOTE HERE EYES ON THE SOLAR

1565

01:23:37,579 --> 01:23:41,709

SUBSTANTIAL HAS A SIMPLE AND
ADVANCED MODE.

1566

01:23:41,709 --> 01:23:45,650

SIMPLE MODE IS FOR EVERYBODY
OVER AGE 30.

1567

01:23:45,650 --> 01:23:49,699

THE ADVANCED MODE IS FOR THE
REST OF US.

1568

01:23:49,699 --> 01:23:52,170

WE'LL START BY SHOWING YOU THE
ADVANCED MODE TO GIVE YOU AN

1569

01:23:52,170 --> 01:23:53,300

IDEA OF CONTEXT.

1570

01:23:53,300 --> 01:23:56,760

ONE OF THE IMPORTANT THINGS TO
DO IS TO MAKE SURE YOU GO

1571

01:23:56,760 --> 01:23:57,760

SCREEN.

1572

01:23:57,760 --> 01:24:00,579
WE REMIND YOU THERE IS A TOGGLE
HERE THAT ALLOWS YOU TO GO FULL

1573
01:24:00,579 --> 01:24:01,789
SCREEN.

1574
01:24:01,789 --> 01:24:04,719
WE PROVIDE FOR YOU A VIRTUAL
CAMERA.

1575
01:24:04,719 --> 01:24:08,619
IT LOOKS LIKE A MOUSE BUT IT'S
ACTUALLY YOUR CAMERA.

1576
01:24:08,619 --> 01:24:11,531
BY CLICKING AND DRAGGING
SOMEWHERE IN SPACE, YOU CAN

1577
01:24:11,531 --> 01:24:13,449
CHANGE THE CAMERA'S VIEWPOINT.

1578
01:24:13,449 --> 01:24:18,840
AND THEN TO CHANGE THE CENTER OF
YOUR FIELD OF VIEW, JUST DOUBLE

1579
01:24:18,840 --> 01:24:20,110
CLICK ON A LABEL.

1580
01:24:20,110 --> 01:24:22,489
I'LL DOUBLE CLICK ON MARS.

1581
01:24:22,489 --> 01:24:25,370
WE WILL FLY TO MARS, DOWNLOAD
THE DATA.

1582
01:24:25,370 --> 01:24:28,780
ALL THE SATELLITES THAT YOU SEE
HERE AND CELESTIAL OBJECTS ARE

1583

01:24:28,780 --> 01:24:30,650

IN THEIR CORRECT LOCATION.

1584

01:24:30,650 --> 01:24:33,739

WE PROVIDE SCALE AND DISTANCE.

1585

01:24:33,739 --> 01:24:37,959

SO I'M GOING TO ZOOM BACK HERE A
WAYS AND KEEP ZOOMING OUT.

1586

01:24:37,959 --> 01:24:42,840

AND WE'RE GOING TO LOOK FOR NEW
HORIZONS.

1587

01:24:42,840 --> 01:24:43,840

AND THERE IT IS.

1588

01:24:43,840 --> 01:24:45,159

IT'S OUT PAST NEPTUNE.

1589

01:24:45,159 --> 01:24:51,130

IF I DOUBLE CLICK ON THE
SPACECRAFT, WE WILL TRAVEL NEW

1590

01:24:51,130 --> 01:24:52,130

HORIZONS.

1591

01:24:52,130 --> 01:24:55,510

THERE IT IS SPINNING AT ITS
PROPER RATE, POINTING ITS

1592

01:24:55,510 --> 01:24:57,010

ANTENNA BACK AT THE EARTH.

1593

01:24:57,010 --> 01:25:00,270

AND PLUTO IS IN THE DISTANCE.

1594

01:25:00,270 --> 01:25:04,909

NOW, I CAN SPEND A GREAT DEAL OF
TIME SHOWING YOU ALL THE VARIOUS

1595

01:25:04,909 --> 01:25:07,170
CONTROLS AT THE BOTTOM.

1596

01:25:07,170 --> 01:25:08,309
DON'T HAVE THAT MUCH TIME.

1597

01:25:08,309 --> 01:25:09,820
I'M GOING TO LET YOU DO THAT ON
YOUR OWN.

1598

01:25:09,820 --> 01:25:12,820
WHAT I'M GOING TO SHOW YOU IS
SOMETHING WE BUILT CALLED EYES

1599

01:25:12,820 --> 01:25:17,719
ON PLUTO THAT GIVES YOU AN
OPPORTUNITY TO SET UP THE USER

1600

01:25:17,719 --> 01:25:20,880
INTERFACE IN A WAY THAT IS
SPECIFIC TO THIS PARTICULAR

1601

01:25:20,880 --> 01:25:21,880
MISSION.

1602

01:25:21,880 --> 01:25:26,059
UNDER "TOURISM FEATURES," CLICK
"NEW HORIZONS."

1603

01:25:26,059 --> 01:25:29,820
THEN WHAT IS TAKING PLACE IS WE
ARE LOADING A SPECIAL USER

1604

01:25:29,820 --> 01:25:36,949
INTERFACE THAT'S ALL ABOUT THE
NEW HORIZONS CLOSEST APPROACH TO

1605
01:25:36,949 --> 01:25:37,959
PLUTO.

1606
01:25:37,959 --> 01:25:41,219
COMPUTER SIMULATION AT THE TOP
AND "LIVE."

1607
01:25:41,219 --> 01:25:46,440
THAT MEANS THAT IS WHERE NEW
HORIZONS IS RIGHT NOW RELATIVE

1608
01:25:46,440 --> 01:25:49,159
TO PLUTO.

1609
01:25:49,159 --> 01:25:53,579
THAT IS YOUR DISTANCE TO PLUTO,
RELATIVE SPEED TO PLUTO, CLOSEST

1610
01:25:53,579 --> 01:25:57,659
APPROACH TIME.
37 DAYS, 17 HOURS, 25 MINUTES.

1611
01:25:57,659 --> 01:25:59,929
AND THEN NOTICE ON THE
RIGHT-HAND SIDE YOU HAVE THE

1612
01:25:59,929 --> 01:26:00,929
CURRENT TIME.

1613
01:26:00,929 --> 01:26:02,810
SO THAT'S RIGHT NOW.

1614
01:26:02,810 --> 01:26:03,810
THERE ARE TWO MODES.

1615
01:26:03,810 --> 01:26:05,170
WE'RE IN
THE LIVE MODE.

1616
01:26:05,170 --> 01:26:07,119
THERE IS ALSO A PREVIEW MODE.

1617
01:26:07,119 --> 01:26:10,199
BEFORE I GO TO PREVIEW MODE, I
WANT TO SHOW YOU THE CAMERA

1618
01:26:10,199 --> 01:26:11,199
MODES.

1619
01:26:11,199 --> 01:26:13,789
WE'RE IN RIDE-ALONG MODE, WHICH
MEANS WE ARE RIDING ALONG WITH

1620
01:26:13,789 --> 01:26:17,059
THE SPACECRAFT AND THE CAMERA IS
LOCK ODD PLUTO.

1621
01:26:17,059 --> 01:26:20,469
IF I CLICK AND DRAG, PLUTO STAYS
IN THE FIELD OF VIEW.

1622
01:26:20,469 --> 01:26:25,260
IF I SWITCH TO SPACECRAFT
CAMERA, THE FOCUS IS ON NEW

1623
01:26:25,260 --> 01:26:26,260
HORIZONS.

1624
01:26:26,260 --> 01:26:28,539
SO I CAN TURN AND LOOK AT ALL
THE DIFFERENT INSTRUMENTS,

1625
01:26:28,539 --> 01:26:32,900
ROTATE AROUND, GO BACK TO EARTH,
LOOK WHEREVER I WANT.

1626
01:26:32,900 --> 01:26:36,719
AND THEN THERE'S†-- I'LL GET TO

THE OVERVIEW WHEN I MOVE TO THE

1627

01:26:41,039 --> 01:26:37,929

PREVIEW MODE.

1628

01:26:41,039 --> 01:26:42,599

AND I'M GOING TO GO AHEAD AND
CLICK PREVIEW.

1629

01:26:42,599 --> 01:26:47,890

WHAT PREVIEW WILL DO, IT TAKES
YOU ONE DAY FROM THE EVENT.

1630

01:26:47,890 --> 01:26:51,199

I'M GOING TO GO TO RIDE ALONG.

1631

01:26:51,199 --> 01:26:55,070

AND NOW YOU ARE LOOKING AT
WHAT'S GOING TO TAKE PLACE JULY

1632

01:26:55,070 --> 01:26:58,869

13th AT 10:00 A.M.

1633

01:26:58,869 --> 01:27:03,389

WHEN YOU SEE THOSE COLORED LINES
PROJECTING FROM THE SPACECRAFT,

1634

01:27:03,389 --> 01:27:05,699

THOSE ARE THE FIELD OF VIEW
LINES FOR THE VARIOUS

1635

01:27:05,699 --> 01:27:08,010

INSTRUMENTS.

1636

01:27:08,010 --> 01:27:11,010

IT'S AT TEN MINUTES A SECOND
NOW.

1637

01:27:11,010 --> 01:27:14,900

THIS IS THE SEQUENCE WE WERE
GIVEN BY OUR COLLEAGUES HERE AT

1638

01:27:14,900 --> 01:27:15,900

A PL.

1639

01:27:15,900 --> 01:27:19,789

THIS IS WHAT IT'S GOING TO BE
DOING AS THE TIME INDICATED.

1640

01:27:19,789 --> 01:27:27,170

SO IF YOU COME TO THE SOFTWARE
ON THAT MORNING.

1641

01:27:27,170 --> 01:27:29,070

IT IS ABOUT 50,000 MILES AWAY.

1642

01:27:29,070 --> 01:27:33,880

I'M GOING TO GO AT ABOUT 30
SECONDS A SECOND.

1643

01:27:33,880 --> 01:27:38,469

SO YOU CAN SEE THAT THE
SPACECRAFT IS VERY, VERY ACTIVE

1644

01:27:38,469 --> 01:27:39,469

DURING THIS PERIOD.

1645

01:27:39,469 --> 01:27:40,780

YOU CAN SEE WHERE IT'S LOCATED.

1646

01:27:40,780 --> 01:27:45,059

THIS WINDOW HERE SHOWS YOU THE
INSTRUMENTS THAT ARE TURNED ON.

1647

01:27:45,059 --> 01:27:47,920

SO, FOR EXAMPLE, LET ME SNIP
THAT ONE ON.

1648

01:27:47,920 --> 01:27:52,050
YOU CAN SEE, LORI, RALPH, ALICE,
ARE ALL POWERED UP, WHICH MEANS

1649
01:27:52,050 --> 01:27:53,800
THEY CAN BE TAKING DATA.

1650
01:27:53,800 --> 01:28:02,869
THE FIELD OF VIEW LINES FOR LORI
IS 1,000x1,000 IMAGE.

1651
01:28:02,869 --> 01:28:04,550
SO THERE'S ANOTHER FEATURE.

1652
01:28:04,550 --> 01:28:07,559
YOU CAN ROLL OVER EACH ONE OF
THE INSTRUMENT NAMES AND WE WILL

1653
01:28:07,559 --> 01:28:11,679
TELL YOU WHAT THOSE INSTRUMENTS
DO.

1654
01:28:11,679 --> 01:28:16,570
SO THIS TOOL, NASA'S EYES,
ALLOWS YOU TO BE THE ARMCHAIR

1655
01:28:16,570 --> 01:28:17,570
EXPLORER.

1656
01:28:17,570 --> 01:28:20,510
I PROMISED I WOULD SHOW THE
SPACECRAFT TO YOU-- EXCUSE ME,

1657
01:28:20,510 --> 01:28:21,510
THE OVERVIEW.

1658
01:28:21,510 --> 01:28:25,519
IF YOU HIT OVERVIEW, IT SHOWS
YOU WHERE THE SPACECRAFT IS

1659

01:28:25,519 --> 01:28:27,269
RELATIVE TO THE SYSTEM.

1660

01:28:27,269 --> 01:28:31,269
AND, AGAIN, ON JULY 14th AT 7:00
IN THE MORNING, IT'S STILL

1661

01:28:31,269 --> 01:28:32,269
COMING IN.

1662

01:28:32,269 --> 01:28:33,800
ALL RIGHT.

1663

01:28:33,800 --> 01:28:37,420
SO I WILL PAUSE NOW FOR ANY
QUESTIONS THAT MAY BE EITHER IN

1664

01:28:37,420 --> 01:28:38,420
THE ROOM OR ELSEWHERE.

1665

01:28:38,420 --> 01:28:42,389
>> WE HAVE TIME FOR ONE QUICK
QUESTION.

1666

01:28:42,389 --> 01:28:44,949
ANY QUESTIONS?

1667

01:28:44,949 --> 01:28:49,989
ALL RIGHT.

1668

01:28:49,989 --> 01:28:53,130
>> THE SOFTWARE IS NOT OPEN
SOURCED BUT IS AVAILABLE TO

1669

01:28:53,130 --> 01:28:56,820
ANYBODY ON A WINDOW OR MacINTOSH
COMPUTER TO OPERATE IN THIS

1670

01:28:56,820 --> 01:28:59,000
FASHION.

1671
01:28:59,000 --> 01:29:01,189
>> WONDERFUL.

1672
01:29:01,189 --> 01:29:03,909
HOPEFULLY YOU WILL GO DOWNLOAD
EYES ON THE SOLAR SYSTEM IN

1673
01:29:03,909 --> 01:29:05,980
ORDER TO FOLLOW ALONG ON THE
FLY-BY.

1674
01:29:05,980 --> 01:29:10,579
FOR MORE INFORMATION ON
EVERYTHING LEADING UP TO THE

1675
01:29:10,579 --> 01:29:12,630
FLY-BY.

1676
01:29:12,630 --> 01:29:18,780
VISIT NASA.GOV/NEW HORIZONS.

1677
01:29:18,780 --> 01:29:22,820
BE SURE TO FOLLOW ALONG WITH
EVERYTHING THAT NASA HAS GOING

1678
01:29:22,820 --> 01:29:24,510
ON SOCIAL MEDIA.

1679
01:29:24,510 --> 01:29:26,539
THANK YOU ALL FOR JOINING US
TODAY FOR THE NASA SOCIAL.

1680
01:29:26,539 --> 01:29:27,639
WE'RE GETTING REALLY EXCITED.

1681
01:29:27,639 --> 01:29:29,090

JULY 14th IS COMING.

1682

01:29:29,090 --> 01:29:30,500

PLUTO IS COMING.

1683

01:29:30,500 --> 01:29:34,229

WE HOPE TO GET SOME OF THE BEST
RESULTS WE HAVE HAD AND LOOK AT

1684

01:29:34,229 --> 01:29:36,350

A WHOLE NEW PERSPECTIVE ON
PLUTO.