1
00:00:07,110 --> 00:00:05,190
well good afternoon and welcome to nasa

2
00:00:08,470 --> 00:00:07,120
headquarters in washington d.c my name

3
00:00:10,790 --> 00:00:08,480
is duane brown

4
00:00:12,709 --> 00:00:10,800
with the office of communications

5
00:00:14,789 --> 00:00:12,719
on july 14th

6
00:00:17,510 --> 00:00:14,799
nasa will make history

7
00:00:19,269 --> 00:00:17,520
with a spacecraft flyby of an object

8
00:00:20,950 --> 00:00:19,279
after traveling almost

9
00:00:22,950 --> 00:00:20,960
10 years

10
00:00:24,150 --> 00:00:22,960
and more than 3 billion miles away from

11
00:00:27,029 --> 00:00:24,160
earth

12
00:00:28,310 --> 00:00:27,039
that object is pluto

13
00:00:30,310 --> 00:00:28,320

today we have

14
00:00:32,389 --> 00:00:30,320
a two-part panel briefing to discuss

15
00:00:34,389 --> 00:00:32,399
plans and related upcoming activities

16
00:00:36,470 --> 00:00:34,399
about the agency's historic new horizons

17
00:00:38,950 --> 00:00:36,480
spacecraft flyby

18
00:00:40,389 --> 00:00:38,960
of the political system this summer

19
00:00:41,830 --> 00:00:40,399
briefing one

20
00:00:44,150 --> 00:00:41,840
will describe the mission's goals

21
00:00:45,750 --> 00:00:44,160
scientific objectives and encounter

22
00:00:49,029 --> 00:00:45,760
plans including

23
00:00:52,069 --> 00:00:49,039
the types of images and other data

24
00:00:54,229 --> 00:00:52,079
that we expect and when

25
00:00:56,229 --> 00:00:54,239
we'll take a 30-minute intermission and

26
00:00:57,590 --> 00:00:56,239
then we come to plan

27
00:00:59,430 --> 00:00:57,600
panel two

28
00:01:01,910 --> 00:00:59,440
well we'll talk in more detail about

29
00:01:04,070 --> 00:01:01,920
this incredible spacecraft

30
00:01:06,469 --> 00:01:04,080
and some of the challenges

31
00:01:07,830 --> 00:01:06,479
the spacecraft could encounter

32
00:01:08,710 --> 00:01:07,840
after

33
00:01:10,710 --> 00:01:08,720
our

34
00:01:13,190 --> 00:01:10,720
presentations we'll take questions from

35
00:01:14,230 --> 00:01:13,200
here headquarters our phone lines across

36
00:01:15,830 --> 00:01:14,240
the country

37
00:01:18,149 --> 00:01:15,840
and of course the social media and

38
00:01:19,910 --> 00:01:18,159

social media ladies and gentlemen is all

39
00:01:22,149 --> 00:01:19,920
abuzz about

40
00:01:23,749 --> 00:01:22,159
nasa's new horizons mission

41
00:01:25,910 --> 00:01:23,759
and of course

42
00:01:28,950 --> 00:01:25,920
send those questions in on hashtag

43
00:01:33,510 --> 00:01:31,590
and all the information here

44
00:01:37,990 --> 00:01:33,520
and about this incredible mission will

45
00:01:41,270 --> 00:01:38,830
new

46
00:01:42,950 --> 00:01:41,280
horizons well before i introduce you to

47
00:01:45,830 --> 00:01:42,960
the panelists and we get into this

48
00:01:47,590 --> 00:01:45,840
incredible mission to set the stage

49
00:01:49,749 --> 00:01:47,600
of this historic mission

50
00:01:52,830 --> 00:01:49,759
it's my honor to ask to

51
00:01:55,830 --> 00:01:52,840
come to the podium five-time space

52
00:01:57,910 --> 00:01:55,840
shuttle flown astronaut

53
00:02:00,149 --> 00:01:57,920
and the head of nasa's

54
00:02:02,789 --> 00:02:00,159
science mission directorate in which

55
00:02:04,630 --> 00:02:02,799
pluto is part of his vast portfolio

56
00:02:07,109 --> 00:02:04,640
please welcome ladies and gentlemen the

57
00:02:18,710 --> 00:02:07,119
head of smd science mission director and

58
00:02:22,309 --> 00:02:21,030
thank you very much duane when when

59
00:02:23,350 --> 00:02:22,319
you're the head of the science mission

60
00:02:25,910 --> 00:02:23,360
directorate

61
00:02:27,270 --> 00:02:25,920
uh the steward of this amazing program

62
00:02:28,790 --> 00:02:27,280
that includes the whole rest of the

63
00:02:31,030 --> 00:02:28,800

universe it's easy

64
00:02:32,710 --> 00:02:31,040
to uh

65
00:02:34,790 --> 00:02:32,720
think about you know the solar system is

66
00:02:36,790 --> 00:02:34,800
one small part of it but it's an amazing

67
00:02:39,110 --> 00:02:36,800
amazing journey that pluto new horizons

68
00:02:40,470 --> 00:02:39,120
has been on for almost the last decade

69
00:02:41,910 --> 00:02:40,480
our mission

70
00:02:43,190 --> 00:02:41,920
is to innovate

71
00:02:46,229 --> 00:02:43,200
explore

72
00:02:48,630 --> 00:02:46,239
discover and inspire

73
00:02:50,550 --> 00:02:48,640
with messenger around mercury a fleet of

74
00:02:53,270 --> 00:02:50,560
earth observation satellites around our

75
00:02:54,630 --> 00:02:53,280
home planet gathering critical data of

76
00:02:56,869 --> 00:02:54,640
the earth system

77
00:02:57,830 --> 00:02:56,879
maven odyssey mars reconnaissance

78
00:03:00,790 --> 00:02:57,840
orbiter

79
00:03:03,190 --> 00:03:00,800
curiosity and opportunity at mars dawn

80
00:03:04,390 --> 00:03:03,200
at the dwarf planet series juneau on its

81
00:03:06,550 --> 00:03:04,400
way to jupiter

82
00:03:07,670 --> 00:03:06,560
cassini at saturn

83
00:03:09,190 --> 00:03:07,680
rosetta

84
00:03:13,350 --> 00:03:09,200
uh

85
00:03:15,830 --> 00:03:13,360
voids are at the edge of the solar

86
00:03:18,070 --> 00:03:15,840
system it's hard to imagine

87
00:03:19,670 --> 00:03:18,080
a more exciting time in solar system

88
00:03:21,990 --> 00:03:19,680

exploration

89
00:03:23,350 --> 00:03:22,000
but it will get even more exciting this

90
00:03:26,390 --> 00:03:23,360
summer

91
00:03:28,710 --> 00:03:26,400
with the encounter by pluto new horizons

92
00:03:30,309 --> 00:03:28,720
as it flies through the pluto system

93
00:03:33,750 --> 00:03:30,319
and gives us our first close-up and

94
00:03:35,350 --> 00:03:33,760
personal view of the planet pluto

95
00:03:37,190 --> 00:03:35,360
the us has been a leader in space

96
00:03:39,110 --> 00:03:37,200
exploration of our solar system being

97
00:03:41,190 --> 00:03:39,120
first to successfully make it to every

98
00:03:43,430 --> 00:03:41,200
planet in our solar system

99
00:03:45,270 --> 00:03:43,440
out to neptune so far

100
00:03:49,910 --> 00:03:45,280
and the pluto new horizons mission will

101
00:03:51,270 --> 00:03:49,920
cap off our grand tour to solar system

102
00:03:54,229 --> 00:03:51,280
i have absolutely no doubt that the

103
00:03:56,710 --> 00:03:54,239
pluto system holds many surprises for us

104
00:03:58,149 --> 00:03:56,720
and the pluto new horizons team is ready

105
00:04:00,630 --> 00:03:58,159
for it

106
00:04:03,030 --> 00:04:00,640
we're entering a new realm as the pluto

107
00:04:05,270 --> 00:04:03,040
new horizon zooms towards pluto the

108
00:04:07,030 --> 00:04:05,280
realm of the kuiper belt a region that

109
00:04:08,630 --> 00:04:07,040
holds the story of the beginnings of our

110
00:04:10,229 --> 00:04:08,640
solar system

111
00:04:12,390 --> 00:04:10,239
pluto and its moons and the other

112
00:04:14,869 --> 00:04:12,400
objects that we will discover represent

113
00:04:17,670 --> 00:04:14,879

a new class of targets for our solar

114
00:04:19,270 --> 00:04:17,680
system exploration and beyond

115
00:04:21,030 --> 00:04:19,280
and we're out there

116
00:04:22,710 --> 00:04:21,040
so with that i'll hand it back to duane

117
00:04:35,990 --> 00:04:22,720
to introduce the panel thank you very

118
00:04:39,110 --> 00:04:37,110
okay

119
00:04:41,270 --> 00:04:39,120
fasten your seat belts here we go

120
00:04:42,950 --> 00:04:41,280
first up your hair

121
00:04:45,749 --> 00:04:42,960
jim green

122
00:04:49,990 --> 00:04:45,759
director of planetary science nasa

123
00:04:53,670 --> 00:04:51,590
alan stern

124
00:04:56,870 --> 00:04:53,680
new horizons principal investigator

125
00:05:01,110 --> 00:04:56,880
southwest research institute boulder

126
00:05:05,270 --> 00:05:02,550
william mckinnon

127
00:05:10,469 --> 00:05:05,280
new horizons co-investigator washington

128
00:05:15,110 --> 00:05:12,710
kathy olken

129
00:05:17,749 --> 00:05:15,120
new horizons deputy project scientist

130
00:05:20,150 --> 00:05:17,759
also at the southwest research institute

131
00:05:22,070 --> 00:05:20,160
and with that i'll toss it to you jim

132
00:05:23,909 --> 00:05:22,080
thank you very much duane

133
00:05:26,390 --> 00:05:23,919
you know when we look back at the 50

134
00:05:29,510 --> 00:05:26,400
years of planetary science we've

135
00:05:31,670 --> 00:05:29,520
methodically explored our solar system

136
00:05:33,990 --> 00:05:31,680
and we've done it in a very unique way

137
00:05:36,469 --> 00:05:34,000
we've started out with flybys

138
00:05:39,510 --> 00:05:36,479

we fly by all the major objects that's

139
00:05:41,749 --> 00:05:39,520
our major first step in doing the early

140
00:05:43,830 --> 00:05:41,759
reconnaissance of our solar system

141
00:05:45,270 --> 00:05:43,840
from the flybys we learn then what we

142
00:05:46,870 --> 00:05:45,280
want to go back to

143
00:05:49,909 --> 00:05:46,880
we then orbit

144
00:05:52,390 --> 00:05:49,919
more complicated missions our land rove

145
00:05:54,070 --> 00:05:52,400
and even return samples

146
00:05:56,710 --> 00:05:54,080
as john mentioned

147
00:05:59,510 --> 00:05:56,720
we are at the stage now of completing

148
00:06:02,309 --> 00:05:59,520
that first initial step

149
00:06:03,670 --> 00:06:02,319
by fly buying uh pluto and the pluto

150
00:06:06,150 --> 00:06:03,680
system

151
00:06:08,150 --> 00:06:06,160
we've used the mariners for all the

152
00:06:10,390 --> 00:06:08,160
terrestrial planets the voyagers and the

153
00:06:12,950 --> 00:06:10,400
pioneers for the outer planets

154
00:06:15,110 --> 00:06:12,960
and now the new horizons missions will

155
00:06:17,270 --> 00:06:15,120
complete that next step that initial

156
00:06:19,670 --> 00:06:17,280
flyby of pluto

157
00:06:22,950 --> 00:06:19,680
what a historic time we have

158
00:06:24,550 --> 00:06:22,960
and in fact the mission last week on uh

159
00:06:27,830 --> 00:06:24,560
april 9th

160
00:06:30,309 --> 00:06:27,840
uh took a good look at pluto again

161
00:06:32,469 --> 00:06:30,319
and sharon and if i can have my first

162
00:06:35,590 --> 00:06:32,479
image

163
00:06:38,710 --> 00:06:35,600

here we see uh with the ralph instrument

164
00:06:39,830 --> 00:06:38,720
uh visible a visual imager uh color

165
00:06:42,230 --> 00:06:39,840
imager

166
00:06:44,950 --> 00:06:42,240
uh the first really great color

167
00:06:48,390 --> 00:06:44,960
observation of pluto

168
00:06:51,670 --> 00:06:48,400
and sharon now sharon's in the uh

169
00:06:53,270 --> 00:06:51,680
lower left quadrant and and you can see

170
00:06:55,029 --> 00:06:53,280
immediately a number of major

171
00:06:58,710 --> 00:06:55,039
differences pluto seems to be very

172
00:06:59,749 --> 00:06:58,720
bright it seems to be redder it's not as

173
00:07:05,110 --> 00:06:59,759
dim

174
00:07:07,350 --> 00:07:05,120
so these are already tantalizing

175
00:07:10,070 --> 00:07:07,360
glimpses of this system what is it

176
00:07:12,230 --> 00:07:10,080
telling us is it telling us more about

177
00:07:14,390 --> 00:07:12,240
the atmosphere of pluto does it tell us

178
00:07:17,110 --> 00:07:14,400
anything about sharon its surface

179
00:07:19,510 --> 00:07:17,120
perhaps it has an atmosphere also

180
00:07:21,990 --> 00:07:19,520
so the compositional differences new

181
00:07:24,710 --> 00:07:22,000
horizons will examine the geological

182
00:07:27,110 --> 00:07:24,720
differences new horizons will examine

183
00:07:28,950 --> 00:07:27,120
and it will observe all sorts of other

184
00:07:32,230 --> 00:07:28,960
wonderful things in that system

185
00:07:34,870 --> 00:07:32,240
including all the smaller moons

186
00:07:36,710 --> 00:07:34,880
now we are at a great historic stage in

187
00:07:38,550 --> 00:07:36,720
this in this mission

188
00:07:40,550 --> 00:07:38,560

and so today's press conference we're

189
00:07:41,990 --> 00:07:40,560
going to methodically provide you some

190
00:07:43,749 --> 00:07:42,000
background

191
00:07:46,950 --> 00:07:43,759
and bring you along

192
00:07:49,029 --> 00:07:46,960
with the exciting uh mission as we have

193
00:07:50,950 --> 00:07:49,039
scripted it and as we believe it will be

194
00:07:53,350 --> 00:07:50,960
pulled off but i know there will be

195
00:07:56,390 --> 00:07:53,360
fabulous surprises along the way and so

196
00:07:58,790 --> 00:07:56,400
to get us started let me now pass it to

197
00:08:01,830 --> 00:07:58,800
alan stern the principal investigator of

198
00:08:03,189 --> 00:08:01,840
the new horizons mission alan

199
00:08:05,189 --> 00:08:03,199
thank you jim

200
00:08:07,749 --> 00:08:05,199
well welcome everybody

201
00:08:09,990 --> 00:08:07,759
we're excited uh it sounds like science

202
00:08:11,990 --> 00:08:10,000
fiction but it's not

203
00:08:14,230 --> 00:08:12,000
three months from today nasa's new

204
00:08:16,710 --> 00:08:14,240
horizons spacecraft will make the first

205
00:08:19,029 --> 00:08:16,720
exploration of the pluto system the

206
00:08:22,150 --> 00:08:19,039
kuiper belt and the farthest shore of

207
00:08:23,749 --> 00:08:22,160
exploration ever reached by humankind

208
00:08:25,830 --> 00:08:23,759
and today we're going to tell you in

209
00:08:27,749 --> 00:08:25,840
great detail about

210
00:08:29,830 --> 00:08:27,759
how the mission came to be

211
00:08:31,270 --> 00:08:29,840
what the mission consists of what kind

212
00:08:32,469 --> 00:08:31,280
of science we're going to do and why

213
00:08:33,589 --> 00:08:32,479

we're doing it

214
00:08:35,029 --> 00:08:33,599
and then we're going to tell you about

215
00:08:36,149 --> 00:08:35,039
what images you will see come to the

216
00:08:38,310 --> 00:08:36,159
ground

217
00:08:39,829 --> 00:08:38,320
and other things as well a full set of

218
00:08:42,550 --> 00:08:39,839
briefings and we look forward to your

219
00:08:44,310 --> 00:08:42,560
questions as well if i can have the next

220
00:08:46,230 --> 00:08:44,320
time step i want to say

221
00:08:49,030 --> 00:08:46,240
that this mission harkens back to the

222
00:08:51,590 --> 00:08:49,040
60s and the 70s and 80s when we first

223
00:08:52,389 --> 00:08:51,600
opened up the solar system as jim said

224
00:08:55,829 --> 00:08:52,399
with

225
00:08:57,030 --> 00:08:55,839
uh historic missions named mariner and

226
00:08:59,269 --> 00:08:57,040
voyager

227
00:09:01,430 --> 00:08:59,279
and others like pioneer

228
00:09:03,190 --> 00:09:01,440
and it's really been since 1989 in the

229
00:09:04,470 --> 00:09:03,200
conclusion of the voyager program at

230
00:09:06,630 --> 00:09:04,480
neptune

231
00:09:08,550 --> 00:09:06,640
since we've gone to

232
00:09:10,790 --> 00:09:08,560
a place like going to pluto to go

233
00:09:13,269 --> 00:09:10,800
farther to go to a planet that's beyond

234
00:09:15,190 --> 00:09:13,279
to see a point of light as carl sagan

235
00:09:17,829 --> 00:09:15,200
said turned into a planet before our

236
00:09:20,150 --> 00:09:17,839
very eyes in a matter of weeks

237
00:09:22,790 --> 00:09:20,160
this is an amazing opportunity for

238
00:09:25,030 --> 00:09:22,800

for science education it's an amazing

239
00:09:26,630 --> 00:09:25,040
opportunity for all of us

240
00:09:29,269 --> 00:09:26,640
and we are so looking forward to it as

241
00:09:31,430 --> 00:09:29,279
scientists to go exploring this whole

242
00:09:33,750 --> 00:09:31,440
new realm of the solar system and this

243
00:09:36,470 --> 00:09:33,760
new miniature planetary system called

244
00:09:38,310 --> 00:09:36,480
pluto and its satellites this is a

245
00:09:40,470 --> 00:09:38,320
mission of firsts

246
00:09:42,310 --> 00:09:40,480
first of course that's the first

247
00:09:44,150 --> 00:09:42,320
uh spacecraft to the pluto system but

248
00:09:46,310 --> 00:09:44,160
it's also the fastest spacecraft ever

249
00:09:48,070 --> 00:09:46,320
launched it's the first mission to a

250
00:09:49,509 --> 00:09:48,080
binary planet

251
00:09:52,230 --> 00:09:49,519
it is the first mission to the kuiper

252
00:09:53,910 --> 00:09:52,240
belt the first mission in nasa's new

253
00:09:55,190 --> 00:09:53,920
frontiers program that jim is the

254
00:09:56,790 --> 00:09:55,200
steward of

255
00:09:58,470 --> 00:09:56,800
is the first p i led mission to the

256
00:10:00,150 --> 00:09:58,480
outer planets and something i'm

257
00:10:02,069 --> 00:10:00,160
particularly proud of

258
00:10:03,190 --> 00:10:02,079
new horizons is the first mission

259
00:10:05,190 --> 00:10:03,200
launched

260
00:10:07,030 --> 00:10:05,200
in the planetary program to carry a

261
00:10:09,590 --> 00:10:07,040
student-built instrument

262
00:10:12,870 --> 00:10:09,600
and you'll hear more about that as well

263
00:10:16,069 --> 00:10:12,880

let's turn to the next time step

264
00:10:17,990 --> 00:10:16,079
and the one after this which shows you a

265
00:10:20,790 --> 00:10:18,000
series of mission studies that were done

266
00:10:23,030 --> 00:10:20,800
beginning in 1990 to formulate mission

267
00:10:25,030 --> 00:10:23,040
concepts for pluto and we're showing

268
00:10:26,949 --> 00:10:25,040
this to you today because we want to

269
00:10:28,550 --> 00:10:26,959
emphasize how long

270
00:10:29,910 --> 00:10:28,560
the scientific community in the united

271
00:10:32,630 --> 00:10:29,920
states

272
00:10:34,389 --> 00:10:32,640
has wanted to explore these worlds

273
00:10:36,870 --> 00:10:34,399
beginning with pluto 350 and then

274
00:10:39,030 --> 00:10:36,880
extending to mariner mark ii pluto fast

275
00:10:41,590 --> 00:10:39,040
flyby photo express and then pluto

276
00:10:44,470 --> 00:10:41,600
corporate express nasa conducted a whole

277
00:10:46,389 --> 00:10:44,480
series of increasingly refined

278
00:10:47,590 --> 00:10:46,399
engineering and science studies for how

279
00:10:50,310 --> 00:10:47,600
to go about

280
00:10:52,069 --> 00:10:50,320
a flyby reconnaissance and then nasa

281
00:10:54,710 --> 00:10:52,079
conducted a competition

282
00:10:57,350 --> 00:10:54,720
an open competition in 2001 between

283
00:10:59,190 --> 00:10:57,360
teams and our team new horizons was

284
00:11:02,949 --> 00:10:59,200
fortunate to win

285
00:11:05,269 --> 00:11:02,959
in the years following that from 2002 to

286
00:11:07,269 --> 00:11:05,279
2005 we designed

287
00:11:08,630 --> 00:11:07,279
built and tested the spacecraft we're

288
00:11:10,069 --> 00:11:08,640

going to be telling you about its

289
00:11:12,230 --> 00:11:10,079
instrument payload

290
00:11:15,110 --> 00:11:12,240
launched it in 2006

291
00:11:17,190 --> 00:11:15,120
as john and jim told you on an epic

292
00:11:19,990 --> 00:11:17,200
almost 10-year voyage across the entire

293
00:11:22,550 --> 00:11:20,000
expanse of our solar system the first

294
00:11:24,870 --> 00:11:22,560
such voyage of the 21st century

295
00:11:26,470 --> 00:11:24,880
if i can have the next time step

296
00:11:28,710 --> 00:11:26,480
um i'm going to be telling you a little

297
00:11:30,949 --> 00:11:28,720
bit now about the kuiper belt and the

298
00:11:33,430 --> 00:11:30,959
dot that you see at the lower um portion

299
00:11:36,150 --> 00:11:33,440
of the screen that's that's um in orbit

300
00:11:38,069 --> 00:11:36,160
is pluto which was discovered in 1930

301
00:11:40,389 --> 00:11:38,079
and was sort of without context until

302
00:11:42,949 --> 00:11:40,399
the early 1990s when objects in the

303
00:11:44,310 --> 00:11:42,959
kuiper belt which you see being revealed

304
00:11:46,630 --> 00:11:44,320
in this video

305
00:11:49,110 --> 00:11:46,640
began to be discovered

306
00:11:50,870 --> 00:11:49,120
this is an amazing and fundamental

307
00:11:53,350 --> 00:11:50,880
change in our view of the solar system

308
00:11:56,230 --> 00:11:53,360
before the 90s we didn't know that this

309
00:11:57,750 --> 00:11:56,240
third zone of the solar system existed

310
00:11:59,910 --> 00:11:57,760
we knew about the inner zone of the

311
00:12:00,629 --> 00:11:59,920
terrestrial planets and we knew about

312
00:12:05,030 --> 00:12:00,639
the

313
00:12:08,310 --> 00:12:05,040

middle solar system but this new third

314
00:12:10,310 --> 00:12:08,320
zone as john grunsfeld told you a relic

315
00:12:12,389 --> 00:12:10,320
from the era of planetary formation has

316
00:12:13,990 --> 00:12:12,399
so much new to teach us

317
00:12:17,269 --> 00:12:14,000
it is the largest structure in the

318
00:12:18,949 --> 00:12:17,279
planetary system containing comets

319
00:12:21,110 --> 00:12:18,959
like rosetta's target

320
00:12:23,509 --> 00:12:21,120
containing the building blocks of small

321
00:12:26,470 --> 00:12:23,519
planets and small planets

322
00:12:28,550 --> 00:12:26,480
not just pluto but others as well

323
00:12:30,550 --> 00:12:28,560
so if i could have the next view graph i

324
00:12:32,710 --> 00:12:30,560
want to talk a little bit about that new

325
00:12:35,269 --> 00:12:32,720
population beyond

326
00:12:36,870 --> 00:12:35,279
being the third zone of the solar system

327
00:12:39,030 --> 00:12:36,880
the kuiper belt taught us that there's a

328
00:12:41,750 --> 00:12:39,040
third class of planets in our solar

329
00:12:44,069 --> 00:12:41,760
system the dwarf planets of which pluto

330
00:12:45,910 --> 00:12:44,079
is the first discovered the brightest

331
00:12:48,150 --> 00:12:45,920
and the largest

332
00:12:50,069 --> 00:12:48,160
as it turns out and you can see in this

333
00:12:52,710 --> 00:12:50,079
diagram there are many of them and

334
00:12:54,470 --> 00:12:52,720
they're very heterogeneous population

335
00:12:57,030 --> 00:12:54,480
they have different colors different

336
00:12:59,829 --> 00:12:57,040
surface compositions uh most do not have

337
00:13:01,430 --> 00:12:59,839
atmospheres some like pluto do they have

338
00:13:03,910 --> 00:13:01,440

different numbers of satellites ranging

339
00:13:04,829 --> 00:13:03,920
from zero to pluto as a record holder at

340
00:13:07,590 --> 00:13:04,839
five

341
00:13:08,949 --> 00:13:07,600
currently and what's perhaps most

342
00:13:11,750 --> 00:13:08,959
interesting to me

343
00:13:14,150 --> 00:13:11,760
is that the number of dwarf planets

344
00:13:16,069 --> 00:13:14,160
that are already known outnumbers the

345
00:13:18,790 --> 00:13:16,079
combined population of the terrestrial

346
00:13:20,389 --> 00:13:18,800
planets and the giant planets

347
00:13:22,550 --> 00:13:20,399
it's it's really a revolution in

348
00:13:24,310 --> 00:13:22,560
planetary science and

349
00:13:25,829 --> 00:13:24,320
we who are representing the mission and

350
00:13:28,069 --> 00:13:25,839
telling you about it today in these two

351
00:13:30,310 --> 00:13:28,079
panels are so proud to be able to carry

352
00:13:31,670 --> 00:13:30,320
the torch of exploration and the torch

353
00:13:34,710 --> 00:13:31,680
of knowledge

354
00:13:36,310 --> 00:13:34,720
to illuminate these new worlds if i can

355
00:13:38,310 --> 00:13:36,320
have the next view graph

356
00:13:40,629 --> 00:13:38,320
it was this revolution that i just

357
00:13:43,990 --> 00:13:40,639
described the third zone of the solar

358
00:13:44,790 --> 00:13:44,000
system a third class of planets and the

359
00:13:53,269 --> 00:13:44,800
the

360
00:13:57,910 --> 00:13:53,279
national academy of sciences decadal

361
00:13:59,430 --> 00:13:57,920
survey of 2003 to catapult this mission

362
00:14:01,910 --> 00:13:59,440
and and to

363
00:14:04,230 --> 00:14:01,920

catapult this science to the top of the

364
00:14:05,269 --> 00:14:04,240
priority queue for the new frontiers

365
00:14:07,750 --> 00:14:05,279
program

366
00:14:08,550 --> 00:14:07,760
and as a result this mission was funded

367
00:14:10,790 --> 00:14:08,560
by

368
00:14:13,590 --> 00:14:10,800
congress and the administration and new

369
00:14:15,030 --> 00:14:13,600
horizons was built

370
00:14:16,550 --> 00:14:15,040
if i can have the next time step i want

371
00:14:18,150 --> 00:14:16,560
to talk a little bit about our team and

372
00:14:20,470 --> 00:14:18,160
in fact there are a number of team

373
00:14:22,470 --> 00:14:20,480
members in the audience engineers

374
00:14:24,949 --> 00:14:22,480
scientists mission operations and

375
00:14:27,189 --> 00:14:24,959
mission management people and this this

376
00:14:29,350 --> 00:14:27,199
group just represents the much larger

377
00:14:31,189 --> 00:14:29,360
team that has worked on new horizons

378
00:14:32,069 --> 00:14:31,199
since its inception

379
00:14:34,230 --> 00:14:32,079
um

380
00:14:35,990 --> 00:14:34,240
i have to tell you a lot of people

381
00:14:37,350 --> 00:14:36,000
thought we couldn't do it

382
00:14:39,670 --> 00:14:37,360
and yet we did

383
00:14:42,069 --> 00:14:39,680
and this team gets all the credit they

384
00:14:44,069 --> 00:14:42,079
work nights and weekends relentlessly to

385
00:14:46,389 --> 00:14:44,079
build the mission and to test it and

386
00:14:48,550 --> 00:14:46,399
they have flown it skillfully across

387
00:14:50,310 --> 00:14:48,560
three billion miles of space to be on

388
00:14:52,310 --> 00:14:50,320

pluto's doorstep

389
00:14:54,389 --> 00:14:52,320
and the team consists not just of all

390
00:14:56,949 --> 00:14:54,399
the men and women who've worked so hard

391
00:14:59,430 --> 00:14:56,959
over these years but also

392
00:15:00,949 --> 00:14:59,440
a great variety of organizations

393
00:15:03,350 --> 00:15:00,959
and i can't name them all but i just

394
00:15:05,430 --> 00:15:03,360
want to name a few of the team members i

395
00:15:07,189 --> 00:15:05,440
want to start of course with nasa

396
00:15:08,870 --> 00:15:07,199
because this is nasa's new horizons

397
00:15:11,189 --> 00:15:08,880
mission i also want to mention the

398
00:15:14,069 --> 00:15:11,199
department of energy because as you will

399
00:15:16,150 --> 00:15:14,079
hear later they are a pivotal to our

400
00:15:18,389 --> 00:15:16,160
ability to explore the outer solar

401
00:15:20,389 --> 00:15:18,399
system by providing power supplies that

402
00:15:21,750 --> 00:15:20,399
work at these great distances

403
00:15:23,990 --> 00:15:21,760
in industry

404
00:15:25,750 --> 00:15:24,000
there's of course the core team members

405
00:15:27,590 --> 00:15:25,760
of the new horizons team the southwest

406
00:15:29,189 --> 00:15:27,600
research institute and the johns hopkins

407
00:15:30,710 --> 00:15:29,199
applied physics lab

408
00:15:32,389 --> 00:15:30,720
but additionally there are companies

409
00:15:34,230 --> 00:15:32,399
like ball aerospace

410
00:15:36,870 --> 00:15:34,240
and lockheed martin

411
00:15:39,030 --> 00:15:36,880
and aerojet and many others large and

412
00:15:41,030 --> 00:15:39,040
small across the united states that

413
00:15:43,590 --> 00:15:41,040

contributed to this program

414
00:15:45,749 --> 00:15:43,600
over time over 2500 americans worked to

415
00:15:47,189 --> 00:15:45,759
build and fly this spacecraft and to

416
00:15:49,110 --> 00:15:47,199
launch its rocket

417
00:15:50,470 --> 00:15:49,120
and i can't tell you how proud i am of

418
00:15:53,030 --> 00:15:50,480
the people that have worked on this and

419
00:15:54,470 --> 00:15:53,040
made this possible and how grateful we

420
00:15:57,030 --> 00:15:54,480
are as a science team

421
00:15:58,710 --> 00:15:57,040
the people who've got us all this way to

422
00:16:00,389 --> 00:15:58,720
pluto's doorstep

423
00:16:02,389 --> 00:16:00,399
now let me turn to the spacecraft in the

424
00:16:03,749 --> 00:16:02,399
payload and give you a brief overview

425
00:16:05,590 --> 00:16:03,759
you'll be hearing more from other

426
00:16:07,670 --> 00:16:05,600
speakers later in fact beginning with

427
00:16:09,189 --> 00:16:07,680
bill mckinnon next but if i can have the

428
00:16:12,629 --> 00:16:09,199
next time step

429
00:16:15,430 --> 00:16:12,639
this is a small compact highly advanced

430
00:16:18,470 --> 00:16:15,440
spacecraft a real 21st century

431
00:16:21,430 --> 00:16:18,480
exploration spacecraft with tremendous

432
00:16:22,389 --> 00:16:21,440
capability that's in almost

433
00:16:23,269 --> 00:16:22,399
um

434
00:16:24,949 --> 00:16:23,279
almost

435
00:16:27,110 --> 00:16:24,959
the most wonderful place you could ever

436
00:16:29,590 --> 00:16:27,120
imagine you could be as a scientist the

437
00:16:31,910 --> 00:16:29,600
spacecraft is in perfect health it's

438
00:16:34,790 --> 00:16:31,920

full of fuel and it's carrying a

439
00:16:36,470 --> 00:16:34,800
scientific arsenal of seven instruments

440
00:16:38,470 --> 00:16:36,480
that are combined

441
00:16:40,870 --> 00:16:38,480
the most powerful suite

442
00:16:43,189 --> 00:16:40,880
of scientific instruments ever brought

443
00:16:44,550 --> 00:16:43,199
to bear on the first reconnaissance of a

444
00:16:45,990 --> 00:16:44,560
new planet

445
00:16:48,310 --> 00:16:46,000
nothing like this has been done in a

446
00:16:50,949 --> 00:16:48,320
quarter century and nothing like this is

447
00:16:52,150 --> 00:16:50,959
planned by any space agency

448
00:16:54,310 --> 00:16:52,160
ever again

449
00:16:56,310 --> 00:16:54,320
this is a real moment in time

450
00:16:58,629 --> 00:16:56,320
for you to watch us turn as i said a

451
00:17:00,150 --> 00:16:58,639
point of light into a planet

452
00:17:01,910 --> 00:17:00,160
you'll hear more about the individual

453
00:17:03,670 --> 00:17:01,920
capabilities of these instruments but i

454
00:17:05,750 --> 00:17:03,680
just want to point out two metrics about

455
00:17:07,990 --> 00:17:05,760
them that give you a feeling for the

456
00:17:09,829 --> 00:17:08,000
technology that's involved

457
00:17:12,470 --> 00:17:09,839
if you weighed all seven instruments

458
00:17:15,350 --> 00:17:12,480
aboard new horizons the combined weight

459
00:17:17,590 --> 00:17:15,360
of these seven very advanced instruments

460
00:17:19,590 --> 00:17:17,600
is less than just the camera on the

461
00:17:20,549 --> 00:17:19,600
cassini saturn orbiter

462
00:17:22,789 --> 00:17:20,559
and

463
00:17:24,949 --> 00:17:22,799

if they were all running at once they

464
00:17:28,390 --> 00:17:24,959
would draw only 28 watts

465
00:17:30,549 --> 00:17:28,400
about half a standard 60 watt light bulb

466
00:17:33,350 --> 00:17:30,559
isn't that amazing i never can i never

467
00:17:36,789 --> 00:17:33,360
get over that it's a real tribute to the

468
00:17:38,950 --> 00:17:36,799
engineers and the foresight of of nasa

469
00:17:40,870 --> 00:17:38,960
with those 1990 studies to create these

470
00:17:43,990 --> 00:17:40,880
advanced instruments that could go on a

471
00:17:47,190 --> 00:17:44,000
small contact compact spacecraft at very

472
00:17:48,230 --> 00:17:47,200
high speed to cross our solar system

473
00:17:50,070 --> 00:17:48,240
now that i've told you about the

474
00:17:52,070 --> 00:17:50,080
spacecraft and just a little about its

475
00:17:53,190 --> 00:17:52,080
payload i want to say something about

476
00:17:54,310 --> 00:17:53,200
our target

477
00:17:57,430 --> 00:17:54,320
pluto

478
00:17:59,669 --> 00:17:57,440
next step

479
00:18:01,990 --> 00:17:59,679
and and tell you this is a scientific

480
00:18:04,470 --> 00:18:02,000
wonderland as i just said

481
00:18:06,950 --> 00:18:04,480
it is a a binary

482
00:18:09,430 --> 00:18:06,960
pluto and its large texas-sized moon

483
00:18:11,510 --> 00:18:09,440
sharon half its size

484
00:18:13,830 --> 00:18:11,520
are like nothing we have ever visited in

485
00:18:15,830 --> 00:18:13,840
the history of planetary exploration and

486
00:18:18,630 --> 00:18:15,840
surrounding that binary is a

487
00:18:21,190 --> 00:18:18,640
circumbinary system of at least four

488
00:18:22,630 --> 00:18:21,200

more much smaller moons

489
00:18:24,870 --> 00:18:22,640
pluto itself

490
00:18:27,350 --> 00:18:24,880
is a very complex body as bill mckinnon

491
00:18:30,230 --> 00:18:27,360
will tell you about it has an atmosphere

492
00:18:32,470 --> 00:18:30,240
it has seasons the surface markings have

493
00:18:34,950 --> 00:18:32,480
been moving over time

494
00:18:36,390 --> 00:18:34,960
probably indicating shifting snows and

495
00:18:38,150 --> 00:18:36,400
some sort of

496
00:18:40,310 --> 00:18:38,160
process of exchange between the

497
00:18:41,909 --> 00:18:40,320
atmosphere and the surface

498
00:18:44,470 --> 00:18:41,919
we've seen the atmospheric pressure

499
00:18:46,789 --> 00:18:44,480
double or perhaps triple over time while

500
00:18:48,870 --> 00:18:46,799
we've been observing it from the earth

501
00:18:50,870 --> 00:18:48,880
we know that it's rocky on the inside

502
00:18:53,110 --> 00:18:50,880
and icy on the outside

503
00:18:55,350 --> 00:18:53,120
and that it has a whole variety in fact

504
00:18:58,070 --> 00:18:55,360
three different surface volatiles

505
00:19:01,510 --> 00:18:58,080
nitrogen carbon monoxide and methane

506
00:19:03,750 --> 00:19:01,520
that make for probably the most complex

507
00:19:05,750 --> 00:19:03,760
system of interactions

508
00:19:07,190 --> 00:19:05,760
we have ever seen in the history of

509
00:19:08,470 --> 00:19:07,200
exploration between surface and

510
00:19:10,789 --> 00:19:08,480
atmosphere

511
00:19:12,870 --> 00:19:10,799
and then there's sharon the rising star

512
00:19:16,630 --> 00:19:12,880
of this mission what we used to think of

513
00:19:19,190 --> 00:19:16,640

is just pluto's uh only moon now the

514
00:19:21,669 --> 00:19:19,200
largest the other half the binary but

515
00:19:23,990 --> 00:19:21,679
which is completely different to our

516
00:19:25,909 --> 00:19:24,000
knowledge it's has no volatiles on its

517
00:19:28,789 --> 00:19:25,919
surface only water ice

518
00:19:32,230 --> 00:19:28,799
it has a much less rocky interior to our

519
00:19:34,230 --> 00:19:32,240
knowledge it has no atmosphere

520
00:19:35,830 --> 00:19:34,240
but there are tantalizing signs of

521
00:19:38,549 --> 00:19:35,840
surface activity

522
00:19:40,870 --> 00:19:38,559
and in just a matter of weeks and months

523
00:19:41,750 --> 00:19:40,880
as we zoom up on the pluto system this

524
00:19:43,669 --> 00:19:41,760
summer

525
00:19:46,070 --> 00:19:43,679
we're going to see which of those things

526
00:19:47,669 --> 00:19:46,080
is actually the case and what this pair

527
00:19:49,270 --> 00:19:47,679
has in store for us

528
00:19:54,870 --> 00:19:49,280
we're also going to study the four small

529
00:19:59,190 --> 00:19:56,630
let's go to the next time step and i

530
00:20:01,110 --> 00:19:59,200
want to show you an absolutely amazing

531
00:20:01,990 --> 00:20:01,120
image made by the hubble space telescope

532
00:20:04,149 --> 00:20:02,000
across

533
00:20:07,029 --> 00:20:04,159
three billion miles of space

534
00:20:09,830 --> 00:20:07,039
this pixelated image made by the biggest

535
00:20:12,789 --> 00:20:09,840
baddest tool in our inventory the hubble

536
00:20:14,390 --> 00:20:12,799
um is the best picture of pluto itself

537
00:20:16,630 --> 00:20:14,400
ever made

538
00:20:18,310 --> 00:20:16,640

and you can't see very much detail

539
00:20:19,190 --> 00:20:18,320
in fact if this were a picture of the

540
00:20:21,190 --> 00:20:19,200
earth

541
00:20:22,390 --> 00:20:21,200
at the same pixelation

542
00:20:23,750 --> 00:20:22,400
you wouldn't be able to see the

543
00:20:25,830 --> 00:20:23,760
continents

544
00:20:26,870 --> 00:20:25,840
this is to illustrate how little we know

545
00:20:28,390 --> 00:20:26,880
in april

546
00:20:29,830 --> 00:20:28,400
and the next image is to tell you a

547
00:20:31,510 --> 00:20:29,840
little bit about how much we will come

548
00:20:34,630 --> 00:20:31,520
to know by this summer

549
00:20:36,470 --> 00:20:34,640
the image on the left is typical of the

550
00:20:39,270 --> 00:20:36,480
images that new horizons will be

551
00:20:41,990 --> 00:20:39,280
obtaining of new of pluto

552
00:20:43,830 --> 00:20:42,000
on approach in the final weeks in early

553
00:20:45,430 --> 00:20:43,840
july and mid july

554
00:20:46,870 --> 00:20:45,440
of this summer

555
00:20:48,549 --> 00:20:46,880
and the inset

556
00:20:50,230 --> 00:20:48,559
the blow up if you will that shows a

557
00:20:52,310 --> 00:20:50,240
portion of new york city

558
00:20:54,630 --> 00:20:52,320
made it the same resolution as our best

559
00:20:56,870 --> 00:20:54,640
images of pluto as if new horizons had

560
00:21:00,070 --> 00:20:56,880
flown over new york and looked down from

561
00:21:01,909 --> 00:21:00,080
the same altitude reveals amazing detail

562
00:21:04,070 --> 00:21:01,919
you can not only pick out the hudson and

563
00:21:05,750 --> 00:21:04,080

manhattan in the east river but you can

564
00:21:07,430 --> 00:21:05,760
see central park

565
00:21:09,190 --> 00:21:07,440
if you look closely you can see the

566
00:21:10,630 --> 00:21:09,200
wharfs on the hudson

567
00:21:13,270 --> 00:21:10,640
that's the kind of detail that new

568
00:21:14,470 --> 00:21:13,280
horizons is going to to deliver

569
00:21:16,470 --> 00:21:14,480
so we're really about to have a

570
00:21:18,390 --> 00:21:16,480
revolution in our knowledge

571
00:21:20,230 --> 00:21:18,400
i'd like to go to the next time step and

572
00:21:22,549 --> 00:21:20,240
briefly summarize the objectives the

573
00:21:24,549 --> 00:21:22,559
scientific objectives of this encounter

574
00:21:26,230 --> 00:21:24,559
which you'll be hearing about

575
00:21:27,750 --> 00:21:26,240
and to begin i'd like to say it's a

576
00:21:30,230 --> 00:21:27,760
six-month encounter that actually

577
00:21:31,750 --> 00:21:30,240
started in january we've been doing

578
00:21:33,590 --> 00:21:31,760
environmental monitoring with three of

579
00:21:35,510 --> 00:21:33,600
the instruments on board to understand

580
00:21:37,909 --> 00:21:35,520
the space environment out there in the

581
00:21:40,149 --> 00:21:37,919
kuiper belt where pluto orbits

582
00:21:42,390 --> 00:21:40,159
and just last week we began to turn our

583
00:21:44,390 --> 00:21:42,400
attention to the pluto system the color

584
00:21:46,950 --> 00:21:44,400
image that jim green showed you a little

585
00:21:49,430 --> 00:21:46,960
bit earlier is evidence of that

586
00:21:51,669 --> 00:21:49,440
we're beginning to make high resolution

587
00:21:53,830 --> 00:21:51,679
uh panchromatic as well as color images

588
00:21:55,510 --> 00:21:53,840

spectroscopy will come online

589
00:21:57,830 --> 00:21:55,520
shortly as we start to probe pluto's

590
00:21:59,990 --> 00:21:57,840
composition and in the coming weeks

591
00:22:01,669 --> 00:22:00,000
you'll be seeing more and more imagery

592
00:22:03,590 --> 00:22:01,679
resulting from this

593
00:22:05,990 --> 00:22:03,600
by the time that we are done we will

594
00:22:08,870 --> 00:22:06,000
have mapped pluto and sharon and the

595
00:22:10,470 --> 00:22:08,880
small moons for their geology we will

596
00:22:12,470 --> 00:22:10,480
have mapped their surface temperatures

597
00:22:14,549 --> 00:22:12,480
and their surface compositions

598
00:22:17,270 --> 00:22:14,559
we will measure pluto's atmosphere

599
00:22:18,870 --> 00:22:17,280
determine its structure its escape rate

600
00:22:20,870 --> 00:22:18,880
and its composition

601
00:22:23,750 --> 00:22:20,880
we will address whether pluto or sharon

602
00:22:26,070 --> 00:22:23,760
have interior oceans and they might

603
00:22:27,590 --> 00:22:26,080
we will search for new satellites and

604
00:22:28,630 --> 00:22:27,600
possible rings in the system and we'll

605
00:22:30,310 --> 00:22:28,640
do more

606
00:22:32,950 --> 00:22:30,320
but i'm giving i hope i'm giving you a

607
00:22:35,830 --> 00:22:32,960
feel that there's there's going to be a

608
00:22:38,630 --> 00:22:35,840
rich variety of data sets about this

609
00:22:41,510 --> 00:22:38,640
strange and mysterious system and we're

610
00:22:43,990 --> 00:22:41,520
just so excited i'm going to close by

611
00:22:46,310 --> 00:22:44,000
showing the next time step to give you a

612
00:22:48,470 --> 00:22:46,320
bird's eye view of the entire encounter

613
00:22:50,870 --> 00:22:48,480

which as i said began in january and

614
00:22:52,310 --> 00:22:50,880
last through july we're currently in

615
00:22:53,510 --> 00:22:52,320
april and as i said turning our

616
00:22:55,750 --> 00:22:53,520
attention

617
00:22:57,270 --> 00:22:55,760
now to the scientific study of pluto not

618
00:22:58,710 --> 00:22:57,280
just this environment

619
00:23:00,470 --> 00:22:58,720
but in addition

620
00:23:03,590 --> 00:23:00,480
we're also

621
00:23:05,830 --> 00:23:03,600
intensely involved in navigation

622
00:23:07,430 --> 00:23:05,840
to home in on the exact aim point that

623
00:23:10,149 --> 00:23:07,440
you'll hear about later that we want to

624
00:23:13,270 --> 00:23:10,159
hit to maximize the science an aimpoint

625
00:23:14,789 --> 00:23:13,280
deep in the heart of the pluto system

626
00:23:16,390 --> 00:23:14,799
coupled with that is not just the

627
00:23:18,230 --> 00:23:16,400
ability to find out where we're going

628
00:23:19,750 --> 00:23:18,240
but to correct our course and so you see

629
00:23:22,070 --> 00:23:19,760
that we have a half a dozen

630
00:23:24,950 --> 00:23:22,080
opportunities to trim our course with

631
00:23:25,909 --> 00:23:24,960
our engines to precisely target that aim

632
00:23:27,350 --> 00:23:25,919
point

633
00:23:29,430 --> 00:23:27,360
and as jim alluded to a little bit

634
00:23:30,950 --> 00:23:29,440
earlier we are flying into the unknown

635
00:23:32,870 --> 00:23:30,960
and in the second panel we'll talk a

636
00:23:35,190 --> 00:23:32,880
little bit about that we'll be looking

637
00:23:36,390 --> 00:23:35,200
for hazards on approach and downloading

638
00:23:38,870 --> 00:23:36,400

images

639
00:23:40,870 --> 00:23:38,880
from the spacecraft on the scene

640
00:23:43,110 --> 00:23:40,880
to assess whether there are more moons

641
00:23:44,070 --> 00:23:43,120
or rings that might present hazards and

642
00:23:45,510 --> 00:23:44,080
we'll talk

643
00:23:47,029 --> 00:23:45,520
quite a bit more about that in the

644
00:23:49,990 --> 00:23:47,039
second panel

645
00:23:52,789 --> 00:23:50,000
then following the apex of the encounter

646
00:23:55,269 --> 00:23:52,799
on july 14th the spacecraft will

647
00:23:57,590 --> 00:23:55,279
primarily turn to downlinking all the

648
00:24:00,070 --> 00:23:57,600
data that's collected and in fact this

649
00:24:02,870 --> 00:24:00,080
mission was designed to collect enormous

650
00:24:04,789 --> 00:24:02,880
amounts of data at the system

651
00:24:07,990 --> 00:24:04,799
so much data in fact that it will take

652
00:24:11,590 --> 00:24:08,000
us 16 months to get it all to the ground

653
00:24:14,789 --> 00:24:11,600
the rest of 2015 and most of 2016 will

654
00:24:16,870 --> 00:24:14,799
be filled with uh new data sets landing

655
00:24:19,669 --> 00:24:16,880
on earth from new horizons and the

656
00:24:23,430 --> 00:24:19,679
science team making new discoveries

657
00:24:24,470 --> 00:24:23,440
and um uh discussing them uh with all of

658
00:24:26,149 --> 00:24:24,480
you

659
00:24:29,029 --> 00:24:26,159
we're so looking forward to what we're

660
00:24:31,430 --> 00:24:29,039
about to do we've come such a long way

661
00:24:33,750 --> 00:24:31,440
and we are on pluto's doorstep i want

662
00:24:35,350 --> 00:24:33,760
bill mckinnon now to take over and tell

663
00:24:37,590 --> 00:24:35,360

us a little bit more about this wondrous

664
00:24:39,510 --> 00:24:37,600
system we're headed to bill thank you

665
00:24:40,230 --> 00:24:39,520
ellen

666
00:24:42,070 --> 00:24:40,240
so

667
00:24:43,430 --> 00:24:42,080
i'm going to talk about why we're going

668
00:24:45,590 --> 00:24:43,440
to pluto

669
00:24:48,630 --> 00:24:45,600
if i could have the first slide

670
00:24:51,269 --> 00:24:48,640
the scientific reasons are many

671
00:24:52,870 --> 00:24:51,279
fundamentally

672
00:24:55,669 --> 00:24:52,880
we're going to pluto because it's the

673
00:24:58,390 --> 00:24:55,679
human race's first opportunity to

674
00:25:00,390 --> 00:24:58,400
explore an entirely new class of world

675
00:25:03,510 --> 00:25:00,400
that is these are the small

676
00:25:04,710 --> 00:25:03,520
icy planets of the kuiper belt

677
00:25:06,630 --> 00:25:04,720
now we're going to pluto because of

678
00:25:08,789 --> 00:25:06,640
course it's the most well-known it's the

679
00:25:10,549 --> 00:25:08,799
largest and it's the most complex of all

680
00:25:12,630 --> 00:25:10,559
of these small planets

681
00:25:14,390 --> 00:25:12,640
and this cartoon shows you some of the

682
00:25:17,029 --> 00:25:14,400
diverse phenomena

683
00:25:19,430 --> 00:25:17,039
we hope to study we anticipate that

684
00:25:21,590 --> 00:25:19,440
there will be very complicated geology

685
00:25:23,190 --> 00:25:21,600
we know pluto has an atmosphere it's

686
00:25:25,350 --> 00:25:23,200
actually a nitrogen atmosphere just like

687
00:25:28,310 --> 00:25:25,360
our own here on earth this atmosphere is

688
00:25:32,710 --> 00:25:28,320

freezing to frost on some places and

689
00:25:36,950 --> 00:25:34,789
and we also want to find and we you look

690
00:25:38,070 --> 00:25:36,960
at those arrows all around pluto

691
00:25:40,310 --> 00:25:38,080
part of the atmosphere is actually

692
00:25:43,029 --> 00:25:40,320
escaping off into space and mixing with

693
00:25:44,549 --> 00:25:43,039
the solar wind we also so we want to

694
00:25:46,390 --> 00:25:44,559
understand this very important process

695
00:25:47,909 --> 00:25:46,400
of atmospheric escape

696
00:25:50,070 --> 00:25:47,919
we also want to understand as much as we

697
00:25:51,909 --> 00:25:50,080
can what lies beneath

698
00:25:54,230 --> 00:25:51,919
because even though pluto's icy on its

699
00:25:56,230 --> 00:25:54,240
surface it's actually about half rock in

700
00:25:58,870 --> 00:25:56,240
terms of volume so we think it has a

701
00:25:59,909 --> 00:25:58,880
rock core and it may even have a liquid

702
00:26:02,230 --> 00:25:59,919
ocean

703
00:26:03,830 --> 00:26:02,240
even today

704
00:26:05,190 --> 00:26:03,840
but pluto's not

705
00:26:06,549 --> 00:26:05,200
on its own if i could have the next

706
00:26:08,390 --> 00:26:06,559
slide

707
00:26:10,710 --> 00:26:08,400
pluto has

708
00:26:12,789 --> 00:26:10,720
five moons four of which we didn't even

709
00:26:15,110 --> 00:26:12,799
know about when we started the new

710
00:26:17,190 --> 00:26:15,120
horizons project and these moons all

711
00:26:19,590 --> 00:26:17,200
orbit in a plane and they all go in the

712
00:26:22,149 --> 00:26:19,600
same direction around pluto so it's the

713
00:26:25,190 --> 00:26:22,159

pluto is actually like a miniature

714
00:26:27,029 --> 00:26:25,200
planetary system and the details

715
00:26:28,870 --> 00:26:27,039
the architectural details of this system

716
00:26:31,029 --> 00:26:28,880
are fascinating and they'll tell us

717
00:26:33,190 --> 00:26:31,039
about pluto's origin and they'll also

718
00:26:36,149 --> 00:26:33,200
tell us about the

719
00:26:38,870 --> 00:26:36,159
the conditions in the ancient kuiper

720
00:26:41,510 --> 00:26:38,880
belt where pluto formed

721
00:26:42,950 --> 00:26:41,520
and at the heart of the pluto system in

722
00:26:45,909 --> 00:26:42,960
the next step

723
00:26:48,870 --> 00:26:45,919
is of course pluto but also its big

724
00:26:50,870 --> 00:26:48,880
moon the moon is as big as texas

725
00:26:53,590 --> 00:26:50,880
and in fact we think of pluto and sharon

726
00:26:55,190 --> 00:26:53,600
is actually a binary planet

727
00:26:56,789 --> 00:26:55,200
and the closest thing in the rest of the

728
00:26:59,350 --> 00:26:56,799
solar system is the earth and its moon

729
00:27:01,350 --> 00:26:59,360
it's not quite a binary but it's almost

730
00:27:03,590 --> 00:27:01,360
and there's really a link between our

731
00:27:06,470 --> 00:27:03,600
planet and pluto because we think that

732
00:27:08,470 --> 00:27:06,480
both our moon and sharon formed in a

733
00:27:10,149 --> 00:27:08,480
colossal giant impact of course

734
00:27:12,549 --> 00:27:10,159
obviously in different places but it's

735
00:27:14,070 --> 00:27:12,559
the same formation process

736
00:27:16,950 --> 00:27:14,080
so what i'm going to show you next is a

737
00:27:18,470 --> 00:27:16,960
video a super computer simulation

738
00:27:20,630 --> 00:27:18,480

we can roll that

739
00:27:22,149 --> 00:27:20,640
and this was created by dr robin canup

740
00:27:24,310 --> 00:27:22,159
at the southwest research institute in

741
00:27:26,789 --> 00:27:24,320
boulder and it shows two pluto-like

742
00:27:29,029 --> 00:27:26,799
objects colliding kind of off-center and

743
00:27:31,350 --> 00:27:29,039
then material is spinning around and

744
00:27:33,430 --> 00:27:31,360
being distorted by tides and over the

745
00:27:34,870 --> 00:27:33,440
course of maybe a little more than a day

746
00:27:37,350 --> 00:27:34,880
most of the material collects in the

747
00:27:39,590 --> 00:27:37,360
center that we identify with pluto and

748
00:27:42,070 --> 00:27:39,600
there's a final blob that goes into a

749
00:27:44,310 --> 00:27:42,080
stable orbit and that we identify with

750
00:27:45,909 --> 00:27:44,320
the big moon sharon and if you're if

751
00:27:47,750 --> 00:27:45,919
your vision is really sharp you'll see a

752
00:27:50,630 --> 00:27:47,760
lot of little blue specks in the

753
00:27:53,510 --> 00:27:50,640
background of this graphic and those are

754
00:27:55,590 --> 00:27:53,520
icy fragments and those will make a disc

755
00:27:57,830 --> 00:27:55,600
and from that disc will be born all of

756
00:27:59,909 --> 00:27:57,840
the small satellites the four we know

757
00:28:04,230 --> 00:27:59,919
about and maybe more that we hope to

758
00:28:04,240 --> 00:28:08,230
now in the next time step

759
00:28:12,389 --> 00:28:10,630
collisions like i just showed you were

760
00:28:14,230 --> 00:28:12,399
probably quite common

761
00:28:15,830 --> 00:28:14,240
in the early kuiper belt but in fact

762
00:28:17,190 --> 00:28:15,840
there's still a lot of bodies in the

763
00:28:18,789 --> 00:28:17,200

kuiper belt you can actually see here

764
00:28:20,789 --> 00:28:18,799
the trajectory of the new horizons

765
00:28:22,230 --> 00:28:20,799
spacecraft crossing the orbits of the

766
00:28:24,310 --> 00:28:22,240
giant planets

767
00:28:25,750 --> 00:28:24,320
all of those small dots are actually

768
00:28:27,430 --> 00:28:25,760
there are hundreds of thousands of them

769
00:28:29,750 --> 00:28:27,440
maybe millions of them most of them are

770
00:28:33,110 --> 00:28:29,760
small like comets but there are some

771
00:28:34,549 --> 00:28:33,120
major bodies small planets like pluto

772
00:28:35,750 --> 00:28:34,559
and some of them are even labeled in

773
00:28:38,389 --> 00:28:35,760
that figure

774
00:28:39,830 --> 00:28:38,399
so the new horizons mission is the first

775
00:28:42,549 --> 00:28:39,840
one

776
00:28:46,149 --> 00:28:42,559
knowingly sent to explore

777
00:28:48,230 --> 00:28:46,159
this new realm of the solar system

778
00:28:50,630 --> 00:28:48,240
next time step

779
00:28:53,669 --> 00:28:50,640
and as we do that by exploring the pluto

780
00:28:55,510 --> 00:28:53,679
system we can then learn more about the

781
00:28:56,830 --> 00:28:55,520
other bodies the other major bodies

782
00:28:58,710 --> 00:28:56,840
which are only

783
00:29:00,070 --> 00:28:58,720
telescopic

784
00:29:02,149 --> 00:29:00,080
points of light

785
00:29:02,950 --> 00:29:02,159
to us right now like in the upper left

786
00:29:05,590 --> 00:29:02,960
there

787
00:29:07,590 --> 00:29:05,600
eris about it's a pluto sized world but

788
00:29:09,750 --> 00:29:07,600

it's so far from the sun its atmosphere

789
00:29:12,470 --> 00:29:09,760
is completely frozen out

790
00:29:15,269 --> 00:29:12,480
or in the upper right mache mache it's

791
00:29:16,950 --> 00:29:15,279
kind of a pluto junior whose nitrogen

792
00:29:19,190 --> 00:29:16,960
atmosphere has escaped because of the

793
00:29:21,029 --> 00:29:19,200
lower gravity because it's smaller

794
00:29:22,470 --> 00:29:21,039
leaving only methane ice behind which

795
00:29:24,470 --> 00:29:22,480
has basically turned red from

796
00:29:27,669 --> 00:29:24,480
embarrassment

797
00:29:29,510 --> 00:29:27,679
and at the lower left there's haumea

798
00:29:31,669 --> 00:29:29,520
a small planet that has suffered an even

799
00:29:32,630 --> 00:29:31,679
more catastrophic collision than pluto

800
00:29:35,190 --> 00:29:32,640
underwent

801
00:29:36,470 --> 00:29:35,200
and all of these worlds as an ensemble

802
00:29:38,149 --> 00:29:36,480
inform

803
00:29:39,590 --> 00:29:38,159
even a broader perspective on the solar

804
00:29:40,630 --> 00:29:39,600
system because you see down in the lower

805
00:29:42,630 --> 00:29:40,640
right

806
00:29:45,430 --> 00:29:42,640
is in fact the largest asteroid and also

807
00:29:47,750 --> 00:29:45,440
considered a small planet that's ceres

808
00:29:49,830 --> 00:29:47,760
it's smaller than the world's i've just

809
00:29:51,269 --> 00:29:49,840
been talking about but we also think on

810
00:29:53,190 --> 00:29:51,279
the inside

811
00:29:55,350 --> 00:29:53,200
it's very icy just like bodies in the

812
00:30:00,549 --> 00:29:55,360
kuiper belt and right now nasa also has

813
00:30:04,070 --> 00:30:02,470

next time step

814
00:30:07,510 --> 00:30:04,080
now that's the big picture

815
00:30:09,110 --> 00:30:07,520
about scientific ideas exploration but

816
00:30:11,269 --> 00:30:09,120
of course to in order to have this

817
00:30:13,350 --> 00:30:11,279
mission nasa set out some stipulations

818
00:30:15,750 --> 00:30:13,360
about specific objectives for any

819
00:30:17,510 --> 00:30:15,760
spacecraft that would go to pluto

820
00:30:20,070 --> 00:30:17,520
we have what we call group one are the

821
00:30:22,549 --> 00:30:20,080
things that any mission

822
00:30:24,070 --> 00:30:22,559
must accomplish these are requirements

823
00:30:25,590 --> 00:30:24,080
and things like that you might imagine

824
00:30:27,269 --> 00:30:25,600
you want to really understand the global

825
00:30:28,870 --> 00:30:27,279
geology of pluto you want to understand

826
00:30:32,470 --> 00:30:28,880
the composition of the entire surface of

827
00:30:34,070 --> 00:30:32,480
both pluto sharon and any any new moons

828
00:30:35,830 --> 00:30:34,080
you want to understand the atmosphere

829
00:30:37,909 --> 00:30:35,840
both its composition and structure and

830
00:30:39,750 --> 00:30:37,919
also measure its escape okay and of

831
00:30:40,870 --> 00:30:39,760
course we're going to do that we get a

832
00:30:42,070 --> 00:30:40,880
big check

833
00:30:44,310 --> 00:30:42,080
we wouldn't

834
00:30:46,149 --> 00:30:44,320
mission if we weren't going to do those

835
00:30:47,510 --> 00:30:46,159
things but that's just the group one

836
00:30:49,510 --> 00:30:47,520
next step

837
00:30:51,510 --> 00:30:49,520
there's a whole lot of important science

838
00:30:53,590 --> 00:30:51,520

that we can also do we will be searching

839
00:30:55,669 --> 00:30:53,600
for the time variability that alan

840
00:30:57,669 --> 00:30:55,679
talked about on the surface we'll be

841
00:31:00,149 --> 00:30:57,679
doing stereo imaging so we get

842
00:31:03,110 --> 00:31:00,159
topography of these worlds we'll be

843
00:31:05,350 --> 00:31:03,120
taking very high resolution images we'll

844
00:31:07,190 --> 00:31:05,360
be not just measuring the composition of

845
00:31:08,630 --> 00:31:07,200
the atmosphere kind of like the nitrogen

846
00:31:10,230 --> 00:31:08,640
and the methane and things like that but

847
00:31:13,430 --> 00:31:10,240
we'll be looking for really interesting

848
00:31:14,789 --> 00:31:13,440
minor components like hydrocarbons

849
00:31:17,430 --> 00:31:14,799
and of course and we're going to do all

850
00:31:19,509 --> 00:31:17,440
of these things that's another big check

851
00:31:20,389 --> 00:31:19,519
and finally there's group three next

852
00:31:21,669 --> 00:31:20,399
step

853
00:31:23,110 --> 00:31:21,679
these are things that are just good to

854
00:31:24,950 --> 00:31:23,120
do but you don't have to do to have a

855
00:31:26,149 --> 00:31:24,960
successful mission so we just call those

856
00:31:27,350 --> 00:31:26,159
desired

857
00:31:29,269 --> 00:31:27,360
but you know and that's stuff like

858
00:31:31,029 --> 00:31:29,279
looking for new satellites searching for

859
00:31:32,870 --> 00:31:31,039
interactions of a possible magnetic

860
00:31:34,710 --> 00:31:32,880
field with the solar wind

861
00:31:36,950 --> 00:31:34,720
but you know what we're gonna do do that

862
00:31:40,549 --> 00:31:36,960
too we're gonna do all three okay the

863
00:31:43,350 --> 00:31:40,559

required the important and the desired

864
00:31:45,350 --> 00:31:43,360
how are we gonna do this well next my

865
00:31:47,509 --> 00:31:45,360
last step

866
00:31:49,350 --> 00:31:47,519
just as alan said we have a most

867
00:31:51,590 --> 00:31:49,360
remarkable machine

868
00:31:54,630 --> 00:31:51,600
it has unprecedented capabilities for

869
00:31:56,710 --> 00:31:54,640
the first reconnaissance of a new planet

870
00:31:59,190 --> 00:31:56,720
and what you see in this picture is the

871
00:32:00,870 --> 00:31:59,200
new horizons spacecraft and seven

872
00:32:02,549 --> 00:32:00,880
scientific instruments and so i'd just

873
00:32:04,470 --> 00:32:02,559
like to say just a few words about each

874
00:32:06,950 --> 00:32:04,480
of them down at the seven o'clock

875
00:32:08,549 --> 00:32:06,960
position is our long-range imager okay

876
00:32:10,389 --> 00:32:08,559
this takes black and white pictures but

877
00:32:12,230 --> 00:32:10,399
at very high resolution and this is

878
00:32:14,950 --> 00:32:12,240
stuff i think everybody in this audience

879
00:32:16,789 --> 00:32:14,960
and out there in social media space will

880
00:32:19,190 --> 00:32:16,799
be very interested in and of course the

881
00:32:22,389 --> 00:32:19,200
team will be fascinated too we also have

882
00:32:24,549 --> 00:32:22,399
instruments to measure the solar wind

883
00:32:26,470 --> 00:32:24,559
and the charged particle environment

884
00:32:29,029 --> 00:32:26,480
around pluto we call those swamp and

885
00:32:31,350 --> 00:32:29,039
pepsi up at the top there is the radio

886
00:32:32,710 --> 00:32:31,360
antenna the radio science experiment of

887
00:32:34,950 --> 00:32:32,720
course that's used for communication

888
00:32:37,350 --> 00:32:34,960

with the earth but we also pass radio

889
00:32:39,590 --> 00:32:37,360
waves from the spacecraft to the earth

890
00:32:40,870 --> 00:32:39,600
and back through the atmosphere of pluto

891
00:32:42,870 --> 00:32:40,880
and this will give us the pressure and

892
00:32:45,269 --> 00:32:42,880
temperature profile and we can point the

893
00:32:47,430 --> 00:32:45,279
radio dish right at pluto and sharon and

894
00:32:48,710 --> 00:32:47,440
take their take the surface temperature

895
00:32:50,470 --> 00:32:48,720
directly

896
00:32:53,029 --> 00:32:50,480
down there around the four and five

897
00:32:54,789 --> 00:32:53,039
o'clock are two more imagers one is

898
00:32:56,950 --> 00:32:54,799
called alice this is an ultraviolet

899
00:32:59,509 --> 00:32:56,960
spectrograph and so now we will actually

900
00:33:01,430 --> 00:32:59,519
look at starlight and in fact the sun's

901
00:33:03,190 --> 00:33:01,440
light passing through the atmosphere of

902
00:33:04,710 --> 00:33:03,200
pluto and this is how we determine the

903
00:33:06,230 --> 00:33:04,720
composition of the atmosphere in

904
00:33:08,549 --> 00:33:06,240
exquisite detail

905
00:33:10,549 --> 00:33:08,559
and then ralph is actually two

906
00:33:12,470 --> 00:33:10,559
cameras in one

907
00:33:14,070 --> 00:33:12,480
one is the color camera that was the

908
00:33:15,990 --> 00:33:14,080
source impact of the color image that

909
00:33:18,710 --> 00:33:16,000
jim dream showed you just a few minutes

910
00:33:21,190 --> 00:33:18,720
ago and then along with that is lisa

911
00:33:23,110 --> 00:33:21,200
which is an infrared camera and that's

912
00:33:24,630 --> 00:33:23,120
how we determine the composition of the

913
00:33:26,870 --> 00:33:24,640

surface materials

914
00:33:28,870 --> 00:33:26,880
and at the very bottom there is in fact

915
00:33:30,630 --> 00:33:28,880
a wonderful instrument built by students

916
00:33:33,029 --> 00:33:30,640
at the university of colorado it's a

917
00:33:37,029 --> 00:33:33,039
dust counter and we use this to track

918
00:33:39,509 --> 00:33:37,039
the impact and amount of very tiny dust

919
00:33:41,029 --> 00:33:39,519
motes all through the solar system from

920
00:33:42,470 --> 00:33:41,039
the inner solar system through the realm

921
00:33:43,990 --> 00:33:42,480
of the giant planets and out into the

922
00:33:46,549 --> 00:33:44,000
third zone

923
00:33:49,029 --> 00:33:46,559
so i speak for the entire

924
00:33:52,470 --> 00:33:49,039
science team in that we are thrilled to

925
00:33:55,509 --> 00:33:52,480
be truly on final approach to pluto

926
00:33:57,830 --> 00:33:55,519
and i'm now going to turn over

927
00:33:58,630 --> 00:33:57,840
the dyes too kathy alton who tell you

928
00:34:00,789 --> 00:33:58,640
about

929
00:34:01,669 --> 00:34:00,799
what data is coming down when that's

930
00:34:03,590 --> 00:34:01,679
right

931
00:34:05,430 --> 00:34:03,600
good afternoon i'm really excited to be

932
00:34:08,149 --> 00:34:05,440
here talking to you about new horizons

933
00:34:09,829 --> 00:34:08,159
and express especially about what data

934
00:34:12,149 --> 00:34:09,839
will be coming down when i'm going to

935
00:34:12,869 --> 00:34:12,159
start with an overview

936
00:34:14,869 --> 00:34:12,879
so

937
00:34:17,430 --> 00:34:14,879
you got to see the image that dr jim

938
00:34:19,750 --> 00:34:17,440

green revealed this afternoon

939
00:34:22,950 --> 00:34:19,760
which was our first ever color image of

940
00:34:25,430 --> 00:34:22,960
pluto and sharon taken from new horizons

941
00:34:27,430 --> 00:34:25,440
as you could see pluto is still a point

942
00:34:29,030 --> 00:34:27,440
of light from our vantage point in the

943
00:34:31,349 --> 00:34:29,040
solar system

944
00:34:34,310 --> 00:34:31,359
but starting in may pluto will get the

945
00:34:36,389 --> 00:34:34,320
most the highest resolution images ever

946
00:34:39,109 --> 00:34:36,399
and it's going to get better every day

947
00:34:41,829 --> 00:34:39,119
from there every day we travel almost a

948
00:34:44,149 --> 00:34:41,839
million miles closer to pluto so it's

949
00:34:45,990 --> 00:34:44,159
going to be really exciting

950
00:34:47,589 --> 00:34:46,000
each day is going to reveal something

951
00:34:50,550 --> 00:34:47,599
new

952
00:34:52,550 --> 00:34:50,560
one highlight will be in mid-july

953
00:34:54,790 --> 00:34:52,560
in mid-july we'll have our closest

954
00:34:57,109 --> 00:34:54,800
approach and some of the data sets that

955
00:35:00,230 --> 00:34:57,119
we'll bring down will have a resolution

956
00:35:02,550 --> 00:35:00,240
of about a quarter of a mile on pluto

957
00:35:04,710 --> 00:35:02,560
and its largest moon sharon that's going

958
00:35:06,310 --> 00:35:04,720
to be really exciting to see

959
00:35:07,990 --> 00:35:06,320
but as you've heard

960
00:35:09,829 --> 00:35:08,000
it's going to take a long time to get

961
00:35:11,750 --> 00:35:09,839
the data down

962
00:35:14,630 --> 00:35:11,760
near closest approach

963
00:35:16,790 --> 00:35:14,640

new horizons is filling our recorders

964
00:35:19,109 --> 00:35:16,800
with all the data that we can fit it's

965
00:35:20,390 --> 00:35:19,119
about 60 gigabits

966
00:35:22,470 --> 00:35:20,400
and

967
00:35:24,790 --> 00:35:22,480
at the distance of pluto it takes a

968
00:35:27,589 --> 00:35:24,800
while to return data it

969
00:35:29,589 --> 00:35:27,599
so it's going to have to wait and we'll

970
00:35:32,550 --> 00:35:29,599
be sending data down all the way out

971
00:35:34,150 --> 00:35:32,560
until the end of october 2016.

972
00:35:36,310 --> 00:35:34,160
we're going to have surprises and

973
00:35:39,510 --> 00:35:36,320
discoveries over the next year and a

974
00:35:42,310 --> 00:35:39,520
half as pluto reveals itself which with

975
00:35:46,470 --> 00:35:42,320
each and every dsn pass

976
00:35:50,310 --> 00:35:47,990
there as you heard there's a great

977
00:35:52,310 --> 00:35:50,320
diversity of the science data that we'll

978
00:35:55,270 --> 00:35:52,320
be taking with new horizons to study

979
00:35:57,589 --> 00:35:55,280
pluto its moons and its environment

980
00:35:59,349 --> 00:35:57,599
we're already getting imaging data down

981
00:36:01,990 --> 00:35:59,359
from the lori instrument and the ralph

982
00:36:04,230 --> 00:36:02,000
instrument and plasma data

983
00:36:06,310 --> 00:36:04,240
in may and june we will begin

984
00:36:09,270 --> 00:36:06,320
atmospheric studies and composition

985
00:36:11,430 --> 00:36:09,280
studies of the surface ices

986
00:36:13,190 --> 00:36:11,440
in july we're going to be hitting pluto

987
00:36:15,190 --> 00:36:13,200
with everything we have

988
00:36:16,870 --> 00:36:15,200

that's going to be showtime

989
00:36:19,270 --> 00:36:16,880
so we're going to we're going to be

990
00:36:22,069 --> 00:36:19,280
bringing down specific observations that

991
00:36:24,870 --> 00:36:22,079
we're choosing to sample the diversity

992
00:36:26,790 --> 00:36:24,880
of the pluto system in that time period

993
00:36:29,670 --> 00:36:26,800
but as i mentioned before not everything

994
00:36:32,150 --> 00:36:29,680
can come down in july

995
00:36:34,870 --> 00:36:32,160
physics just doesn't allow that

996
00:36:36,710 --> 00:36:34,880
so in august you can see from the

997
00:36:38,950 --> 00:36:36,720
graphic that we're just going to be

998
00:36:41,109 --> 00:36:38,960
bringing down plasma data there's a

999
00:36:44,710 --> 00:36:41,119
really good reason for that we have a

1000
00:36:47,109 --> 00:36:44,720
very small operations team and our team

1001
00:36:49,430 --> 00:36:47,119
needs to keep our eye on the ball when

1002
00:36:51,510 --> 00:36:49,440
we're flying by pluto to make sure that

1003
00:36:52,710 --> 00:36:51,520
we make the most of this historic

1004
00:36:53,589 --> 00:36:52,720
encounter

1005
00:36:56,310 --> 00:36:53,599
and

1006
00:36:58,550 --> 00:36:56,320
to that in august the data that comes

1007
00:37:01,349 --> 00:36:58,560
down in august needs to be commanded

1008
00:37:03,270 --> 00:37:01,359
back in june and july and so it's really

1009
00:37:05,829 --> 00:37:03,280
important that we make it easy for our

1010
00:37:08,470 --> 00:37:05,839
team to concentrate on getting the most

1011
00:37:10,069 --> 00:37:08,480
out of pluto and therefore in august

1012
00:37:12,310 --> 00:37:10,079
what you'll see coming down from new

1013
00:37:15,030 --> 00:37:12,320

horizons will be plasma data because

1014
00:37:17,349 --> 00:37:15,040
that's the easiest to send to the ground

1015
00:37:19,430 --> 00:37:17,359
then in september we'll pick up again

1016
00:37:21,670 --> 00:37:19,440
with the full diversity of the science

1017
00:37:25,750 --> 00:37:21,680
data set that we have coming down

1018
00:37:28,069 --> 00:37:25,760
and it will continue coming down until

1019
00:37:30,710 --> 00:37:28,079
late in 2016.

1020
00:37:32,069 --> 00:37:30,720
next time step

1021
00:37:33,430 --> 00:37:32,079
so i'm sure you all are really

1022
00:37:35,589 --> 00:37:33,440
interested in what's going to come down

1023
00:37:38,069 --> 00:37:35,599
during the week of encounter the week of

1024
00:37:41,030 --> 00:37:38,079
encounter is the week of july 12th our

1025
00:37:42,950 --> 00:37:41,040
closest approach is july 14th

1026
00:37:45,990 --> 00:37:42,960
and we're going to be bringing down a

1027
00:37:48,630 --> 00:37:46,000
huge variety of data data would which

1028
00:37:50,950 --> 00:37:48,640
tells us about the temperatures on pluto

1029
00:37:52,710 --> 00:37:50,960
detailed atmospheric studies some parts

1030
00:37:54,870 --> 00:37:52,720
of that data set will come down

1031
00:37:56,950 --> 00:37:54,880
compositional maps of both pluto and

1032
00:37:59,109 --> 00:37:56,960
sharon we're going to be getting plasma

1033
00:38:01,510 --> 00:37:59,119
data down we're going to be looking at

1034
00:38:04,310 --> 00:38:01,520
geologic and color imaging

1035
00:38:05,910 --> 00:38:04,320
this image here on the top on the slide

1036
00:38:08,950 --> 00:38:05,920
shows you

1037
00:38:12,150 --> 00:38:08,960
manhattan at about a quarter mile

1038
00:38:13,829 --> 00:38:12,160

resolution this is a typical for this is

1039
00:38:15,910 --> 00:38:13,839
what we'll be getting down during the

1040
00:38:18,550 --> 00:38:15,920
week of closest approach

1041
00:38:21,510 --> 00:38:18,560
so we'll be able to see great detail on

1042
00:38:22,470 --> 00:38:21,520
pluto and sharon well beyond what we see

1043
00:38:25,349 --> 00:38:22,480
today

1044
00:38:27,750 --> 00:38:25,359
as these worlds of just points of light

1045
00:38:28,950 --> 00:38:27,760
it's going to be really exciting

1046
00:38:33,589 --> 00:38:28,960
so

1047
00:38:35,990 --> 00:38:33,599
that on the actual closest approach day

1048
00:38:37,270 --> 00:38:36,000
we will not be bringing back any imaging

1049
00:38:39,910 --> 00:38:37,280
data

1050
00:38:42,550 --> 00:38:39,920
we need to keep our sights on pluto we

1051
00:38:44,710 --> 00:38:42,560
need to train our instruments on pluto

1052
00:38:47,990 --> 00:38:44,720
and that means we're not taking time to

1053
00:38:49,829 --> 00:38:48,000
send data back down to earth and so on

1054
00:38:52,069 --> 00:38:49,839
closest approach day we're all going to

1055
00:38:54,790 --> 00:38:52,079
have to be patient while pluto while new

1056
00:38:57,190 --> 00:38:54,800
horizons is exploring pluto

1057
00:38:59,030 --> 00:38:57,200
next time step

1058
00:39:01,829 --> 00:38:59,040
i want to tell you a little bit about

1059
00:39:04,230 --> 00:39:01,839
the long data downlink after our

1060
00:39:07,349 --> 00:39:04,240
encounter i've already spoke some about

1061
00:39:08,870 --> 00:39:07,359
the plasma downlink in august

1062
00:39:10,790 --> 00:39:08,880
in the middle of september we're going

1063
00:39:13,190 --> 00:39:10,800

to have a one week time period where we

1064
00:39:14,950 --> 00:39:13,200
bring down selected high priority data

1065
00:39:17,829 --> 00:39:14,960
sets these are things that we really

1066
00:39:21,109 --> 00:39:17,839
want to get to the ground to help

1067
00:39:23,829 --> 00:39:21,119
fill out our early studies of what pluto

1068
00:39:26,630 --> 00:39:23,839
sharon and its moons look like

1069
00:39:28,790 --> 00:39:26,640
then starting in late september early

1070
00:39:31,750 --> 00:39:28,800
october we will be bringing down what we

1071
00:39:33,990 --> 00:39:31,760
call our browse data set this is all of

1072
00:39:36,470 --> 00:39:34,000
our observations but at a lower

1073
00:39:38,470 --> 00:39:36,480
resolution so we can get them down more

1074
00:39:40,230 --> 00:39:38,480
quickly so this will be able to come

1075
00:39:41,829 --> 00:39:40,240
down in about two months we'll get

1076
00:39:43,270 --> 00:39:41,839
everything down but at a lower

1077
00:39:46,230 --> 00:39:43,280
resolution

1078
00:39:49,430 --> 00:39:46,240
then finally in late november we will

1079
00:39:51,589 --> 00:39:49,440
start our full resolution playback this

1080
00:39:53,109 --> 00:39:51,599
is our high resolution data

1081
00:39:54,870 --> 00:39:53,119
every

1082
00:39:57,270 --> 00:39:54,880
image that's on the spacecraft will be

1083
00:39:58,069 --> 00:39:57,280
brought down at full resolution

1084
00:40:00,950 --> 00:39:58,079
and

1085
00:40:03,030 --> 00:40:00,960
that is what really takes uh the longest

1086
00:40:04,870 --> 00:40:03,040
time period to bring down it's those 60

1087
00:40:07,190 --> 00:40:04,880
gigabits of data that we're filling up

1088
00:40:08,390 --> 00:40:07,200

the recorders with and that will be

1089
00:40:10,790 --> 00:40:08,400
played back

1090
00:40:13,109 --> 00:40:10,800
all through 2016.

1091
00:40:15,589 --> 00:40:13,119
so come along with us while we explore

1092
00:40:17,030 --> 00:40:15,599
the third zone of our solar system

1093
00:40:20,550 --> 00:40:17,040
thank you

1094
00:40:22,069 --> 00:40:20,560
transition into our question and answer

1095
00:40:23,910 --> 00:40:22,079
period i'm going to do something a

1096
00:40:27,109 --> 00:40:23,920
little different here we're gonna first

1097
00:40:29,750 --> 00:40:27,119
go to the phone lines uh a number of

1098
00:40:32,309 --> 00:40:29,760
folks are watching us on nasa television

1099
00:40:34,790 --> 00:40:32,319
and on our website www.nasa.gov

1100
00:40:36,470 --> 00:40:34,800
and for social media a lot of buzz out

1101
00:40:38,230 --> 00:40:36,480
there keep sending your questions in

1102
00:40:39,349 --> 00:40:38,240
we'll try to get to as many as we can

1103
00:40:42,630 --> 00:40:39,359
today

1104
00:40:44,230 --> 00:40:42,640
at hashtag ask nasa and for folks who

1105
00:40:46,309 --> 00:40:44,240
are just joining us this is one of two

1106
00:40:47,910 --> 00:40:46,319
panels we will have so don't change that

1107
00:40:50,470 --> 00:40:47,920
remote we'll be coming back to you with

1108
00:40:53,510 --> 00:40:50,480
the second part at 2 30.

1109
00:40:55,510 --> 00:40:53,520
and i see a wide range of ages in our

1110
00:40:58,069 --> 00:40:55,520
audience today and uh if we have time

1111
00:40:59,589 --> 00:40:58,079
we'll see if any of our public here

1112
00:41:01,750 --> 00:40:59,599
who've joined us here nasa headquarters

1113
00:41:03,190 --> 00:41:01,760

has a question on this uh on this

1114
00:41:05,030 --> 00:41:03,200
incredible mission so let's go to the

1115
00:41:11,829 --> 00:41:05,040
phone lines first

1116
00:41:15,829 --> 00:41:14,069
yes hello thanks so much for uh for

1117
00:41:18,390 --> 00:41:15,839
doing this

1118
00:41:20,230 --> 00:41:18,400
this is really a historic opportunity

1119
00:41:22,790 --> 00:41:20,240
for a lot of people who have never seen

1120
00:41:24,630 --> 00:41:22,800
a planet even a dwarf planet sort of

1121
00:41:26,230 --> 00:41:24,640
revealed for the first time and this may

1122
00:41:27,829 --> 00:41:26,240
be the last time

1123
00:41:29,349 --> 00:41:27,839
where there's this opportunity to see a

1124
00:41:31,670 --> 00:41:29,359
new world

1125
00:41:33,270 --> 00:41:31,680
you know sort of laid bare for us with

1126
00:41:34,470 --> 00:41:33,280
images and temperature and all kinds of

1127
00:41:36,069 --> 00:41:34,480
interesting data could

1128
00:41:37,589 --> 00:41:36,079
someone there maybe speak to that sort

1129
00:41:39,349 --> 00:41:37,599
of the

1130
00:41:41,109 --> 00:41:39,359
really interesting

1131
00:41:43,829 --> 00:41:41,119
experience and unique experience this is

1132
00:41:44,950 --> 00:41:43,839
going to offer the world

1133
00:41:47,349 --> 00:41:44,960
sure

1134
00:41:49,190 --> 00:41:47,359
well you know um many of us were alive

1135
00:41:51,430 --> 00:41:49,200
during the time and even participated in

1136
00:41:53,510 --> 00:41:51,440
the voyagers and that was just truly

1137
00:41:56,710 --> 00:41:53,520
exciting uh the

1138
00:41:58,950 --> 00:41:56,720

the computer systems uh were as nearly

1139
00:42:00,470 --> 00:41:58,960
as sophisticated as we have now and and

1140
00:42:04,550 --> 00:42:00,480
there were a lot of printouts coming

1141
00:42:06,710 --> 00:42:04,560
back and and images and and

1142
00:42:09,430 --> 00:42:06,720
instant science even though many of the

1143
00:42:11,430 --> 00:42:09,440
scientists felt very uncomfortable about

1144
00:42:12,710 --> 00:42:11,440
making proclamations about what they see

1145
00:42:14,390 --> 00:42:12,720
in the data

1146
00:42:15,510 --> 00:42:14,400
we're going to experience all that and

1147
00:42:17,750 --> 00:42:15,520
more

1148
00:42:20,150 --> 00:42:17,760
when we do the encounter here

1149
00:42:21,430 --> 00:42:20,160
so indeed this will be a little deja vu

1150
00:42:24,230 --> 00:42:21,440
for some of us

1151
00:42:27,670 --> 00:42:24,240
uh but indeed uh it's one of the most

1152
00:42:31,430 --> 00:42:27,680
exciting steps that we can take

1153
00:42:33,270 --> 00:42:31,440
for for nasa in planetary science

1154
00:42:35,349 --> 00:42:33,280
eric i thought that was a great question

1155
00:42:36,230 --> 00:42:35,359
a great perspective and so let me just

1156
00:42:38,390 --> 00:42:36,240
add

1157
00:42:40,470 --> 00:42:38,400
that i agree with you uh in a real sense

1158
00:42:42,870 --> 00:42:40,480
there's nothing like it in the world

1159
00:42:45,190 --> 00:42:42,880
what nasa is doing with new horizons is

1160
00:42:47,190 --> 00:42:45,200
unprecedented in our time

1161
00:42:48,710 --> 00:42:47,200
and probably

1162
00:42:51,190 --> 00:42:48,720
something close to the last train to

1163
00:42:53,829 --> 00:42:51,200

clarksville the last picture show for a

1164
00:42:55,829 --> 00:42:53,839
very very long time

1165
00:42:57,990 --> 00:42:55,839
i actually did a little research

1166
00:42:59,109 --> 00:42:58,000
with the census bureau data a couple of

1167
00:43:01,910 --> 00:42:59,119
years ago

1168
00:43:04,150 --> 00:43:01,920
and asked the question uh how many

1169
00:43:06,230 --> 00:43:04,160
people in this country probably don't

1170
00:43:08,470 --> 00:43:06,240
remember voyager they weren't born they

1171
00:43:10,309 --> 00:43:08,480
were too young to have ever seen a

1172
00:43:12,630 --> 00:43:10,319
first-time flyby like we're going to do

1173
00:43:14,710 --> 00:43:12,640
with pluto and surprisingly it turned

1174
00:43:16,309 --> 00:43:14,720
out that if i did the numbers right it's

1175
00:43:17,990 --> 00:43:16,319
about half the people in the united

1176
00:43:19,750 --> 00:43:18,000
states and probably about half the

1177
00:43:21,190 --> 00:43:19,760
people across the world

1178
00:43:22,230 --> 00:43:21,200
have never seen anything like this

1179
00:43:24,390 --> 00:43:22,240
before

1180
00:43:27,589 --> 00:43:24,400
so you're absolutely right in in this

1181
00:43:29,109 --> 00:43:27,599
perspective that it's it's really unique

1182
00:43:30,870 --> 00:43:29,119
there hasn't been anything like it for a

1183
00:43:33,589 --> 00:43:30,880
long time and nothing like it coming

1184
00:43:39,510 --> 00:43:37,589
okay next caller is alan boyle from nbc

1185
00:43:45,829 --> 00:43:39,520
alan

1186
00:43:48,870 --> 00:43:45,839
stern uh just on the plan to share the

1187
00:43:50,309 --> 00:43:48,880
images on the web will they be

1188
00:43:53,829 --> 00:43:50,319

sent

1189
00:43:57,670 --> 00:43:53,839
to a website uh probably pluto or pluto

1190
00:43:59,589 --> 00:43:57,680
jhu apl or maybe nasa

1191
00:44:01,829 --> 00:43:59,599
as soon as they're received or is there

1192
00:44:03,670 --> 00:44:01,839
going to be a lag time could you just

1193
00:44:06,069 --> 00:44:03,680
tell us what the plan is going to be for

1194
00:44:07,750 --> 00:44:06,079
distributing images thank you sure thank

1195
00:44:09,829 --> 00:44:07,760
you alan let me tell you a little about

1196
00:44:11,510 --> 00:44:09,839
that but let me also say it's a it's a

1197
00:44:13,430 --> 00:44:11,520
work in progress and we haven't we

1198
00:44:14,630 --> 00:44:13,440
haven't quite pinned down exactly how

1199
00:44:17,190 --> 00:44:14,640
we're going to be doing that we still

1200
00:44:19,109 --> 00:44:17,200
have a little bit of time while uh the

1201
00:44:20,710 --> 00:44:19,119
images are more or less dots in the

1202
00:44:23,190 --> 00:44:20,720
distance if you will

1203
00:44:25,589 --> 00:44:23,200
we're going to be posting uh imagery

1204
00:44:27,430 --> 00:44:25,599
from the lori high resolution camera on

1205
00:44:28,790 --> 00:44:27,440
the web on a number of websites

1206
00:44:30,550 --> 00:44:28,800
including the project website and of

1207
00:44:33,109 --> 00:44:30,560
course nasa is going to be leading with

1208
00:44:34,790 --> 00:44:33,119
nasa websites as well

1209
00:44:36,790 --> 00:44:34,800
we'll probably want to look at those

1210
00:44:39,109 --> 00:44:36,800
images after they land on the ground

1211
00:44:40,950 --> 00:44:39,119
before we post them so that we can add

1212
00:44:42,309 --> 00:44:40,960
captions about image artifacts and

1213
00:44:44,390 --> 00:44:42,319

potentially

1214
00:44:46,710 --> 00:44:44,400
announce discoveries as well

1215
00:44:48,230 --> 00:44:46,720
so it won't be instantaneously loaded to

1216
00:44:50,550 --> 00:44:48,240
the computer because we want to take a

1217
00:44:52,150 --> 00:44:50,560
look first and make sure that that we

1218
00:44:54,069 --> 00:44:52,160
understand the data a little bit but our

1219
00:44:55,670 --> 00:44:54,079
goal is to make it very fast and

1220
00:44:57,670 --> 00:44:55,680
responsive

1221
00:44:59,910 --> 00:44:57,680
and to make it a way that people can

1222
00:45:02,710 --> 00:44:59,920
join in by looking every day and every

1223
00:45:05,030 --> 00:45:02,720
week as we make the approach to pluto

1224
00:45:08,470 --> 00:45:05,040
yeah the top website to look at first

1225
00:45:12,390 --> 00:45:08,480
would be www.nasa.gov

1226
00:45:16,630 --> 00:45:13,910
jim i'm glad you said that i was going

1227
00:45:18,710 --> 00:45:16,640
to say that

1228
00:45:21,670 --> 00:45:18,720
um okay so um

1229
00:45:24,309 --> 00:45:21,680
let's go to social media now lots of

1230
00:45:26,790 --> 00:45:24,319
buzz on that my colleague from

1231
00:45:29,349 --> 00:45:26,800
uh applied physics lab communications

1232
00:45:31,589 --> 00:45:29,359
mike buckley mike uh what's going on in

1233
00:45:33,430 --> 00:45:31,599
the twitter and social media world a lot

1234
00:45:34,630 --> 00:45:33,440
a lot of commentary on the the pictures

1235
00:45:36,710 --> 00:45:34,640
that are out now seeing those first

1236
00:45:38,710 --> 00:45:36,720
color views of pluto and sharon got a

1237
00:45:41,750 --> 00:45:38,720
lot of people excited and some questions

1238
00:45:43,349 --> 00:45:41,760

too so this is one from sky safari astro

1239
00:45:45,109 --> 00:45:43,359
who wants to know will the data from

1240
00:45:46,870 --> 00:45:45,119
different instruments on new horizons be

1241
00:45:49,190 --> 00:45:46,880
combined to learn new information about

1242
00:45:51,349 --> 00:45:49,200
pluto

1243
00:45:54,470 --> 00:45:51,359
well of course i mean we'll be looking

1244
00:45:55,349 --> 00:45:54,480
at looking you know correlating where

1245
00:46:00,309 --> 00:45:55,359
the

1246
00:46:02,069 --> 00:46:00,319
color and black and white images all

1247
00:46:05,190 --> 00:46:02,079
overlap so we're really trying to

1248
00:46:08,150 --> 00:46:05,200
identify where the individual ices and

1249
00:46:10,790 --> 00:46:08,160
individual hydrocarbon or any rock

1250
00:46:13,270 --> 00:46:10,800
regions on either of these bodies pluto

1251
00:46:15,030 --> 00:46:13,280
or sharon lie as an example

1252
00:46:17,190 --> 00:46:15,040
and i'll just add to that with another

1253
00:46:19,109 --> 00:46:17,200
example in studying pluto's atmosphere

1254
00:46:21,349 --> 00:46:19,119
with the alice ultraviolet spectrometer

1255
00:46:23,349 --> 00:46:21,359
that bill spoke about as we watch the

1256
00:46:25,270 --> 00:46:23,359
sunset through pluto's atmosphere to

1257
00:46:28,790 --> 00:46:25,280
determine its composition

1258
00:46:30,309 --> 00:46:28,800
and density as a function of altitude

1259
00:46:32,550 --> 00:46:30,319
we believe from the modeling that's been

1260
00:46:35,109 --> 00:46:32,560
done that eventually the sunlight will

1261
00:46:37,430 --> 00:46:35,119
be entirely extinguished by absorptions

1262
00:46:39,030 --> 00:46:37,440
chemical absorptions in the atmosphere

1263
00:46:41,829 --> 00:46:39,040

and so there'll come an altitude at

1264
00:46:42,790 --> 00:46:41,839
which the alice spectrometer can't probe

1265
00:46:45,190 --> 00:46:42,800
below

1266
00:46:47,510 --> 00:46:45,200
but we'll be using our radio experiment

1267
00:46:49,990 --> 00:46:47,520
rex with that transmission from the deep

1268
00:46:51,589 --> 00:46:50,000
space network that bill spoke about

1269
00:46:53,430 --> 00:46:51,599
which we'll be able to see all the way

1270
00:46:55,589 --> 00:46:53,440
down to the surface not with the same

1271
00:46:57,190 --> 00:46:55,599
compositional capabilities but to

1272
00:46:59,190 --> 00:46:57,200
continue the temperature and pressure

1273
00:47:00,470 --> 00:46:59,200
profile all the way down to the hard

1274
00:47:02,309 --> 00:47:00,480
deck

1275
00:47:04,550 --> 00:47:02,319
and i'll just even add more to that even

1276
00:47:06,550 --> 00:47:04,560
as we understand the composition of

1277
00:47:08,710 --> 00:47:06,560
pluto's atmosphere from the ultraviolet

1278
00:47:10,069 --> 00:47:08,720
spectrometer we'll actually be flying

1279
00:47:12,309 --> 00:47:10,079
through the escaping part of the

1280
00:47:14,790 --> 00:47:12,319
atmosphere and be sampling it directly

1281
00:47:16,710 --> 00:47:14,800
with the swap and pepsi instruments

1282
00:47:18,790 --> 00:47:16,720
yeah and i'd like to add that you can't

1283
00:47:21,109 --> 00:47:18,800
fully understand this complex world

1284
00:47:23,109 --> 00:47:21,119
without looking at it as a whole

1285
00:47:25,829 --> 00:47:23,119
the surface ices the temperature of the

1286
00:47:27,750 --> 00:47:25,839
surface ices support the atmosphere and

1287
00:47:30,230 --> 00:47:27,760
what the atmospheric pressure is so

1288
00:47:34,069 --> 00:47:30,240

we're going to need to look at the whole

1289
00:47:35,990 --> 00:47:34,079
system to understand it in detail

1290
00:47:37,750 --> 00:47:36,000
okay mike let's uh take one more i know

1291
00:47:39,270 --> 00:47:37,760
there a lot coming in and we've got some

1292
00:47:40,549 --> 00:47:39,280
other media from across the country you

1293
00:47:42,069 --> 00:47:40,559
want to call in and i'm gonna see if we

1294
00:47:44,309 --> 00:47:42,079
can take some questions here in the

1295
00:47:45,670 --> 00:47:44,319
audience uh before we uh reach our

1296
00:47:47,430 --> 00:47:45,680
bewitching hour and we have to

1297
00:47:48,790 --> 00:47:47,440
transition for our next panel but mike

1298
00:47:50,150 --> 00:47:48,800
what we got we'll look a little bit

1299
00:47:51,510 --> 00:47:50,160
beyond pluto for a second this is a

1300
00:47:53,670 --> 00:47:51,520
question from neil vlack who wanted to

1301
00:47:55,030 --> 00:47:53,680
know that after a successful mission to

1302
00:47:57,190 --> 00:47:55,040
pluto what kind of work could new

1303
00:48:00,230 --> 00:47:57,200
horizons continue to do along the lines

1304
00:48:03,109 --> 00:48:00,240
of maybe voyager 1 and 2.

1305
00:48:04,790 --> 00:48:03,119
take that off for you i'll be happy to

1306
00:48:06,870 --> 00:48:04,800
what's happened over the last couple

1307
00:48:08,069 --> 00:48:06,880
years as the team has turned its

1308
00:48:09,510 --> 00:48:08,079
attention

1309
00:48:11,990 --> 00:48:09,520
parts of the team have turned its

1310
00:48:13,750 --> 00:48:12,000
attention to looking at the kuiper belt

1311
00:48:15,349 --> 00:48:13,760
and actually discovered more than 50

1312
00:48:17,270 --> 00:48:15,359
kuiper belt objects

1313
00:48:19,349 --> 00:48:17,280

now that search

1314
00:48:21,990 --> 00:48:19,359
has been quite extensive they've used

1315
00:48:23,829 --> 00:48:22,000
every major ground-based facility and

1316
00:48:26,150 --> 00:48:23,839
they've also used a lot of space-based

1317
00:48:28,390 --> 00:48:26,160
facilities and most recently hubble

1318
00:48:29,829 --> 00:48:28,400
spacecraft the hubble space telescope

1319
00:48:31,990 --> 00:48:29,839
was used to

1320
00:48:34,950 --> 00:48:32,000
look deep beyond pluto look into the

1321
00:48:37,510 --> 00:48:34,960
kuiper belt and the whole objective is

1322
00:48:39,990 --> 00:48:37,520
is there a kuiper belt object that may

1323
00:48:41,990 --> 00:48:40,000
be along one of the trajectories that

1324
00:48:43,190 --> 00:48:42,000
new horizon could get to

1325
00:48:44,390 --> 00:48:43,200
and indeed

1326
00:48:46,710 --> 00:48:44,400
hubble

1327
00:48:49,990 --> 00:48:46,720
bore the fruit that the team was looking

1328
00:48:51,190 --> 00:48:50,000
for and there are two candidate objects

1329
00:48:52,710 --> 00:48:51,200
so

1330
00:48:54,309 --> 00:48:52,720
right now the team is turning its

1331
00:48:56,549 --> 00:48:54,319
attention and all of its attention to

1332
00:48:58,710 --> 00:48:56,559
make this encounter successful but

1333
00:49:01,190 --> 00:48:58,720
afterwards they will be given an

1334
00:49:03,750 --> 00:49:01,200
opportunity to propose to nasa to go on

1335
00:49:06,390 --> 00:49:03,760
to one of those two objects

1336
00:49:07,990 --> 00:49:06,400
and i'll add to jim's great answer that

1337
00:49:10,710 --> 00:49:08,000
those two objects

1338
00:49:13,190 --> 00:49:10,720

are each about a billion miles further

1339
00:49:15,109 --> 00:49:13,200
beyond pluto with a travel time of

1340
00:49:16,870 --> 00:49:15,119
approximately three and a half or a

1341
00:49:18,470 --> 00:49:16,880
little bit longer years depending upon

1342
00:49:20,710 --> 00:49:18,480
which target

1343
00:49:23,750 --> 00:49:20,720
and and in addition to uh

1344
00:49:25,510 --> 00:49:23,760
exploring a kuiper belt object if our

1345
00:49:28,309 --> 00:49:25,520
proposal for an extended mission is

1346
00:49:31,990 --> 00:49:28,319
successful um we can as the

1347
00:49:34,309 --> 00:49:32,000
as the questioner asked um also add to

1348
00:49:36,870 --> 00:49:34,319
the kind of data that voyager is

1349
00:49:38,950 --> 00:49:36,880
generating on the space environment swap

1350
00:49:40,790 --> 00:49:38,960
and pepsi the the dust counter built by

1351
00:49:43,750 --> 00:49:40,800
the students some of the other

1352
00:49:46,470 --> 00:49:43,760
instruments as well being very advanced

1353
00:49:48,390 --> 00:49:46,480
um compared to the 1970s technology of

1354
00:49:50,630 --> 00:49:48,400
previous spacecraft can be much more

1355
00:49:53,270 --> 00:49:50,640
sensitive to that space environment and

1356
00:49:55,750 --> 00:49:53,280
add to that library of knowledge too as

1357
00:49:57,349 --> 00:49:55,760
the spacecraft flies outward further and

1358
00:49:59,990 --> 00:49:57,359
further and further from the sun at its

1359
00:50:03,510 --> 00:50:02,230
okay let's go to the phone lines uh then

1360
00:50:04,710 --> 00:50:03,520
we'll come here and see if we have any

1361
00:50:06,870 --> 00:50:04,720
questions uh we're going to have to

1362
00:50:08,710 --> 00:50:06,880
conclude at the top of the hour and my

1363
00:50:10,790 --> 00:50:08,720

apologies i understand we're getting a

1364
00:50:13,030 --> 00:50:10,800
lot of questions in from social media

1365
00:50:14,549 --> 00:50:13,040
we'll get to those uh throughout the day

1366
00:50:15,990 --> 00:50:14,559
as soon as possible so let's go to the

1367
00:50:16,870 --> 00:50:16,000
phone lines

1368
00:50:19,030 --> 00:50:16,880
and

1369
00:50:20,150 --> 00:50:19,040
pete spots christian science monitor

1370
00:50:21,990 --> 00:50:20,160
pete

1371
00:50:25,109 --> 00:50:22,000
well thank you very much

1372
00:50:27,109 --> 00:50:25,119
this is for dr stern i think um you

1373
00:50:28,790 --> 00:50:27,119
mentioned that this is the uh a

1374
00:50:30,630 --> 00:50:28,800
generation that has never seen a mission

1375
00:50:32,309 --> 00:50:30,640
like this before

1376
00:50:34,790 --> 00:50:32,319
at the same time this is also the

1377
00:50:36,630 --> 00:50:34,800
generation whose imagination has been

1378
00:50:38,309 --> 00:50:36,640
captivated by

1379
00:50:40,790 --> 00:50:38,319
extrasolar planets

1380
00:50:42,230 --> 00:50:40,800
and um how would you respond to someone

1381
00:50:44,390 --> 00:50:42,240
who'd say well this is

1382
00:50:46,870 --> 00:50:44,400
you know this is nice uh kind of batting

1383
00:50:48,470 --> 00:50:46,880
cleanup on our solar system but

1384
00:50:51,109 --> 00:50:48,480
we've got this whole

1385
00:50:53,190 --> 00:50:51,119
new horizon of extrasolar planets on our

1386
00:50:54,710 --> 00:50:53,200
platter are there synergies between the

1387
00:50:56,790 --> 00:50:54,720
studies of the two that

1388
00:50:58,470 --> 00:50:56,800

new horizons might contribute to what

1389
00:51:00,150 --> 00:50:58,480
how would you encourage

1390
00:51:01,190 --> 00:51:00,160
people with the extrasolar planet buzz

1391
00:51:04,150 --> 00:51:01,200
to

1392
00:51:06,069 --> 00:51:04,160
oh that's a that's a really great

1393
00:51:08,470 --> 00:51:06,079
question and let me say that um

1394
00:51:11,829 --> 00:51:08,480
in the study of of planets

1395
00:51:14,549 --> 00:51:11,839
um we have had a complete revolution

1396
00:51:15,990 --> 00:51:14,559
since the 1990s here at home in our own

1397
00:51:18,390 --> 00:51:16,000
solar system with the discovery of the

1398
00:51:20,309 --> 00:51:18,400
kuiper belt and small kuiper belt

1399
00:51:22,390 --> 00:51:20,319
planets dwarf planets that we've been

1400
00:51:23,990 --> 00:51:22,400
discussing here and which it's the

1401
00:51:25,670 --> 00:51:24,000
objective of new horizons to make the

1402
00:51:27,430 --> 00:51:25,680
first reconnaissance of

1403
00:51:29,430 --> 00:51:27,440
but then from ground based and then

1404
00:51:30,549 --> 00:51:29,440
space-based observatories like like

1405
00:51:32,870 --> 00:51:30,559
kepler

1406
00:51:34,710 --> 00:51:32,880
discovering that planetary systems are

1407
00:51:36,950 --> 00:51:34,720
common around stars and that there are

1408
00:51:39,349 --> 00:51:36,960
many more types of planets than we see

1409
00:51:41,829 --> 00:51:39,359
just in our own solar system with

1410
00:51:43,829 --> 00:51:41,839
pulsar planets and hot jupiters and

1411
00:51:46,870 --> 00:51:43,839
super earths and quite a number of other

1412
00:51:49,190 --> 00:51:46,880
varieties and so between what's going on

1413
00:51:51,910 --> 00:51:49,200

in our solar system and what's going on

1414
00:51:54,470 --> 00:51:51,920
out in the study of extrasolar planets

1415
00:51:56,230 --> 00:51:54,480
we're seeing that our early notions the

1416
00:51:57,910 --> 00:51:56,240
time that i grew up and was educated

1417
00:51:59,990 --> 00:51:57,920
went to graduate school and studied

1418
00:52:02,390 --> 00:52:00,000
planets there were only two types they

1419
00:52:04,549 --> 00:52:02,400
were either rocky terrestrial worlds or

1420
00:52:07,109 --> 00:52:04,559
they were they were uh giant planets

1421
00:52:09,190 --> 00:52:07,119
like jupiter um out to neptune and now

1422
00:52:12,069 --> 00:52:09,200
we see that that was really a data

1423
00:52:14,549 --> 00:52:12,079
limited perspective that the variety is

1424
00:52:16,470 --> 00:52:14,559
exploding almost as if

1425
00:52:18,150 --> 00:52:16,480
instead you were a biologist who was

1426
00:52:19,670 --> 00:52:18,160
trapped on a desert island for a long

1427
00:52:21,829 --> 00:52:19,680
time and then

1428
00:52:25,349 --> 00:52:21,839
your knowledge limited by only

1429
00:52:27,750 --> 00:52:25,359
the biology on that one island um uh

1430
00:52:29,670 --> 00:52:27,760
expanded by being able with new

1431
00:52:32,150 --> 00:52:29,680
technology to go to other places around

1432
00:52:32,950 --> 00:52:32,160
the earth and see how vast the variety

1433
00:52:34,630 --> 00:52:32,960
is

1434
00:52:36,390 --> 00:52:34,640
so i think the two things are

1435
00:52:38,549 --> 00:52:36,400
complementary we're exploring with

1436
00:52:39,829 --> 00:52:38,559
telescopes at nasa in earth orbit and

1437
00:52:42,309 --> 00:52:39,839
from the ground

1438
00:52:44,470 --> 00:52:42,319

um extrasolar planets and learning

1439
00:52:47,270 --> 00:52:44,480
tremendously exciting things about it

1440
00:52:49,510 --> 00:52:47,280
and at our at her home solar system

1441
00:52:52,390 --> 00:52:49,520
actually going in traveling out

1442
00:52:54,870 --> 00:52:52,400
to our discovery of a new type of planet

1443
00:52:57,030 --> 00:52:54,880
with with new horizons

1444
00:52:59,349 --> 00:52:57,040
i'd like to comment on this if i may uh

1445
00:53:01,109 --> 00:52:59,359
this is really a foundational mission

1446
00:53:04,309 --> 00:53:01,119
well what we're going to be doing here

1447
00:53:07,190 --> 00:53:04,319
is looking at very primitive bodies that

1448
00:53:09,829 --> 00:53:07,200
were left over from the uh

1449
00:53:12,069 --> 00:53:09,839
initial origin of our solar system and

1450
00:53:14,390 --> 00:53:12,079
these are very important to understand

1451
00:53:16,390 --> 00:53:14,400
it can tell us all kinds of things about

1452
00:53:18,470 --> 00:53:16,400
how that process occurred

1453
00:53:21,270 --> 00:53:18,480
and how these objects may have moved

1454
00:53:23,510 --> 00:53:21,280
around throughout the solar system uh

1455
00:53:25,829 --> 00:53:23,520
because we believe at one time the solar

1456
00:53:28,950 --> 00:53:25,839
system did indeed rearrange itself

1457
00:53:30,630 --> 00:53:28,960
pushing neptune and uranus out into the

1458
00:53:31,990 --> 00:53:30,640
kuiper belt and bringing some of those

1459
00:53:33,910 --> 00:53:32,000
objects in

1460
00:53:36,710 --> 00:53:33,920
so as a foundational mission that

1461
00:53:39,349 --> 00:53:36,720
enables us to interpret planets around

1462
00:53:42,069 --> 00:53:39,359
other stars knowing that these type of

1463
00:53:44,790 --> 00:53:42,079

objects must also exist out there and i

1464
00:53:46,710 --> 00:53:44,800
think it's also important to note that

1465
00:53:49,510 --> 00:53:46,720
at least in our lifetime i don't believe

1466
00:53:52,309 --> 00:53:49,520
we'll be able to look at exoplanets like

1467
00:53:54,950 --> 00:53:52,319
we're going to look at pluto we're not

1468
00:53:56,790 --> 00:53:54,960
going to be able to look at the surfaces

1469
00:53:58,950 --> 00:53:56,800
at this resolution

1470
00:54:00,950 --> 00:53:58,960
so we really need to be able to take

1471
00:54:02,790 --> 00:54:00,960
advantage of what we want to learn here

1472
00:54:04,870 --> 00:54:02,800
in our solar system and then that will

1473
00:54:07,910 --> 00:54:04,880
naturally be applied to the extra solar

1474
00:54:09,910 --> 00:54:07,920
planets bill cathy you want to add

1475
00:54:11,270 --> 00:54:09,920
i i think jimmy basically captured what

1476
00:54:13,270 --> 00:54:11,280
i was going to say

1477
00:54:15,030 --> 00:54:13,280
the point is that in fact the the

1478
00:54:17,270 --> 00:54:15,040
discovery and exploration of the kuiper

1479
00:54:19,670 --> 00:54:17,280
belt is a great complement to exoplanets

1480
00:54:21,990 --> 00:54:19,680
because the kuiper belt itself is where

1481
00:54:24,069 --> 00:54:22,000
the evidence lies that our pla solar

1482
00:54:25,910 --> 00:54:24,079
system has not been static like we were

1483
00:54:28,309 --> 00:54:25,920
all taught when we were young on this

1484
00:54:29,750 --> 00:54:28,319
panel that the giant planets formed

1485
00:54:30,790 --> 00:54:29,760
where they were and they sat there for

1486
00:54:33,190 --> 00:54:30,800
the rest of

1487
00:54:34,150 --> 00:54:33,200
time but it isn't so they've they've

1488
00:54:35,910 --> 00:54:34,160

probably

1489
00:54:38,390 --> 00:54:35,920
migrated their orbits have evolved and

1490
00:54:39,990 --> 00:54:38,400
we see evidence of that also in the in

1491
00:54:41,589 --> 00:54:40,000
the hot jupiters and other kinds of

1492
00:54:44,950 --> 00:54:41,599
exoplanets out there in space so it's

1493
00:54:47,109 --> 00:54:44,960
it's it's a it's a whole new perspective

1494
00:54:49,750 --> 00:54:47,119
on planet formation just one more

1495
00:54:51,589 --> 00:54:49,760
connection uh in the work that's been

1496
00:54:54,710 --> 00:54:51,599
done by telescopes on the ground and in

1497
00:54:56,870 --> 00:54:54,720
space by nasa we found kuiper belt

1498
00:54:58,789 --> 00:54:56,880
analogs around other stars and so that's

1499
00:55:01,349 --> 00:54:58,799
a direct connection to the mission that

1500
00:55:03,030 --> 00:55:01,359
we're doing and gives us a chance in our

1501
00:55:05,270 --> 00:55:03,040
home solar system to provide the kind of

1502
00:55:07,670 --> 00:55:05,280
resolution that jim talked about which

1503
00:55:10,390 --> 00:55:07,680
will be a very long time coming for a

1504
00:55:12,870 --> 00:55:10,400
system so far away

1505
00:55:15,190 --> 00:55:12,880
okay uh we're gonna take one more call

1506
00:55:17,910 --> 00:55:15,200
uh for the media that are watching and

1507
00:55:20,309 --> 00:55:17,920
on the phone we will make uh the new

1508
00:55:23,109 --> 00:55:20,319
horizons team available for follow-up

1509
00:55:24,710 --> 00:55:23,119
interviews also dr john grunsfeld

1510
00:55:26,309 --> 00:55:24,720
will be available as i said at the

1511
00:55:28,150 --> 00:55:26,319
beginning this is

1512
00:55:30,470 --> 00:55:28,160
his vast portfolio of almost 100

1513
00:55:32,630 --> 00:55:30,480

missions put on the horizons is in his

1514
00:55:34,390 --> 00:55:32,640
portfolio so uh send those interview

1515
00:55:36,549 --> 00:55:34,400
requests then and we'll get the

1516
00:55:38,390 --> 00:55:36,559
appropriate folks to answer them so

1517
00:55:40,069 --> 00:55:38,400
frank mooring from aviation week and

1518
00:55:42,470 --> 00:55:40,079
then we're going to bring it back here

1519
00:55:44,710 --> 00:55:42,480
and close out frank

1520
00:55:46,549 --> 00:55:44,720
thank you this is kind of an operational

1521
00:55:47,430 --> 00:55:46,559
question i wonder if you can tell me

1522
00:55:49,750 --> 00:55:47,440
what

1523
00:55:50,870 --> 00:55:49,760
the time lag is for commanding and

1524
00:55:53,270 --> 00:55:50,880
receiving

1525
00:55:55,349 --> 00:55:53,280
uh on the day of the flyby

1526
00:55:57,430 --> 00:55:55,359
and how much of your your data

1527
00:55:58,710 --> 00:55:57,440
collection is pre-programmed and whether

1528
00:56:01,270 --> 00:55:58,720
you have

1529
00:56:03,990 --> 00:56:01,280
the possibility of adjusting it as you

1530
00:56:05,990 --> 00:56:04,000
see things as you close in on the planet

1531
00:56:08,470 --> 00:56:06,000
and the same question then in terms of

1532
00:56:10,150 --> 00:56:08,480
returning the data as after you fly by

1533
00:56:12,710 --> 00:56:10,160
thank you

1534
00:56:15,349 --> 00:56:12,720
yes i'm happy to answer that so the

1535
00:56:17,510 --> 00:56:15,359
the time it takes the signal to go from

1536
00:56:19,829 --> 00:56:17,520
earth to the spacecraft is about four

1537
00:56:20,710 --> 00:56:19,839
and a half hours so that's a very long

1538
00:56:22,789 --> 00:56:20,720

time

1539
00:56:24,710 --> 00:56:22,799
and near encounter

1540
00:56:26,710 --> 00:56:24,720
everything is pre-programmed we

1541
00:56:29,030 --> 00:56:26,720
pre-program the sequences of

1542
00:56:31,349 --> 00:56:29,040
observations we'll take we pre-program

1543
00:56:34,470 --> 00:56:31,359
the compression and downlink of the data

1544
00:56:39,589 --> 00:56:37,190
this is all pre-planned because we don't

1545
00:56:41,109 --> 00:56:39,599
have time to be commanding all the time

1546
00:56:44,390 --> 00:56:41,119
we don't want to be spending time

1547
00:56:47,030 --> 00:56:44,400
looking at earth receiving those signals

1548
00:56:48,789 --> 00:56:47,040
so that is all pre-planned

1549
00:56:50,870 --> 00:56:48,799
if there were an emergency we could

1550
00:56:52,069 --> 00:56:50,880
change that but but that is the current

1551
00:56:55,589 --> 00:56:52,079
plan

1552
00:56:57,190 --> 00:56:55,599
is it allows us to thoroughly test the

1553
00:56:58,950 --> 00:56:57,200
sequences which have been done both on

1554
00:57:01,349 --> 00:56:58,960
spacecraft simulators

1555
00:57:03,670 --> 00:57:01,359
many times as well as

1556
00:57:06,789 --> 00:57:03,680
actually putting the very close approach

1557
00:57:08,789 --> 00:57:06,799
sequence up on new horizons in both 2012

1558
00:57:11,109 --> 00:57:08,799
and 2013 and letting the spacecraft

1559
00:57:13,109 --> 00:57:11,119
actually go through its paces as if it

1560
00:57:16,390 --> 00:57:13,119
were uh 2015

1561
00:57:18,390 --> 00:57:16,400
uh and so we've we've um uh taken care

1562
00:57:20,789 --> 00:57:18,400
to make sure that we have a bulletproof

1563
00:57:23,349 --> 00:57:20,799

sequence that's been thoroughly uh

1564
00:57:26,069 --> 00:57:23,359
vetted and that we know will work um

1565
00:57:28,069 --> 00:57:26,079
there at at the pluto system now on the

1566
00:57:30,470 --> 00:57:28,079
downlink it's a little bit different as

1567
00:57:32,390 --> 00:57:30,480
we downlink data and we find uh

1568
00:57:34,309 --> 00:57:32,400
particularly interesting data sets that

1569
00:57:36,870 --> 00:57:34,319
might might tell us that the next thing

1570
00:57:38,230 --> 00:57:36,880
we'd like to get down next month

1571
00:57:39,750 --> 00:57:38,240
might be a little bit different than our

1572
00:57:42,710 --> 00:57:39,760
preconceived notions we'll have more

1573
00:57:43,670 --> 00:57:42,720
flexibility with that

1574
00:57:45,829 --> 00:57:43,680
okay

1575
00:57:48,150 --> 00:57:45,839
unfortunately we're going to have to uh

1576
00:57:50,549 --> 00:57:48,160
close out and transition

1577
00:57:53,270 --> 00:57:50,559
to our 230 briefing today you have been

1578
00:57:55,670 --> 00:57:53,280
listening to the plujo new horizons the

1579
00:57:58,630 --> 00:57:55,680
science the images that are coming down

1580
00:57:59,990 --> 00:57:58,640
and at 2 30 we'll get more involved into

1581
00:58:09,109 --> 00:58:00,000
the

1582
00:58:10,390 --> 00:58:09,119
will be facing i would like to say save

1583
00:58:11,829 --> 00:58:10,400
the date

1584
00:58:14,230 --> 00:58:11,839
july 14th

1585
00:58:16,390 --> 00:58:14,240
and to piggyback off of dr green's deja

1586
00:58:18,950 --> 00:58:16,400
vu moment we all remember the world

1587
00:58:19,990 --> 00:58:18,960
remembers the curiosity landing where

1588
00:58:22,309 --> 00:58:20,000

you were

1589
00:58:25,430 --> 00:58:22,319
ladies and gentlemen you will remember