1
00:00:07,909 --> 00:00:05,749
good morning and welcome i'm jane platt

2
00:00:10,230 --> 00:00:07,919
with nasa's jet propulsion laboratory in

3
00:00:12,470 --> 00:00:10,240
pasadena california

4
00:00:14,789 --> 00:00:12,480
in less than a week nasa's dawn

5
00:00:17,269 --> 00:00:14,799
spacecraft will arrive at the dwarf

6
00:00:19,269 --> 00:00:17,279
planet series i'd like to start out by

7
00:00:21,269 --> 00:00:19,279
introducing the three speakers who will

8
00:00:23,910 --> 00:00:21,279
be telling you more about this historic

9
00:00:26,710 --> 00:00:23,920
mission this morning joining us from

10
00:00:29,669 --> 00:00:26,720
nasa headquarters in washington will be

11
00:00:32,470 --> 00:00:29,679
jim green and he is the

12
00:00:34,150 --> 00:00:32,480
director of nasa's planetary science

13
00:00:36,150 --> 00:00:34,160

division

14
00:00:39,350 --> 00:00:36,160
we will hear from two speakers here at

15
00:00:41,910 --> 00:00:39,360
jpl as well and they are robert mace the

16
00:00:44,630 --> 00:00:41,920
dawn project manager

17
00:00:46,950 --> 00:00:44,640
and carol raymond the dawn deputy

18
00:00:48,630 --> 00:00:46,960
principal investigator

19
00:00:51,430 --> 00:00:48,640
but before we get started i'd like to

20
00:00:53,189 --> 00:00:51,440
introduce our jpl director dr charles

21
00:00:56,790 --> 00:00:53,199
alachi who will make some very brief

22
00:01:00,869 --> 00:00:58,790
good morning

23
00:01:03,990 --> 00:01:00,879
this is a very exciting week in our

24
00:01:05,429 --> 00:01:04,000
quest of exploration and discovery

25
00:01:07,910 --> 00:01:05,439
by the end of this week as it was

26
00:01:09,670 --> 00:01:07,920
mentioned don will arrive to ceres the

27
00:01:11,190 --> 00:01:09,680
first mission ever to investigate the

28
00:01:12,950 --> 00:01:11,200
dwarf planet

29
00:01:15,510 --> 00:01:12,960
it will not only visit but we're

30
00:01:18,550 --> 00:01:15,520
planning to move in and stay

31
00:01:20,390 --> 00:01:18,560
and explore that object for a year

32
00:01:21,830 --> 00:01:20,400
and beyond that we'll stay for a long

33
00:01:24,070 --> 00:01:21,840
time around it

34
00:01:25,670 --> 00:01:24,080
here in the room there are several dawn

35
00:01:27,350 --> 00:01:25,680
team members

36
00:01:29,109 --> 00:01:27,360
some have worked on this mission for

37
00:01:31,670 --> 00:01:29,119
more than a decade

38
00:01:34,149 --> 00:01:31,680

and some are relatively new or this is

39
00:01:36,469 --> 00:01:34,159
their first mission space mission they

40
00:01:38,390 --> 00:01:36,479
all should be very proud of this amazing

41
00:01:40,230 --> 00:01:38,400
you know accomplishment

42
00:01:42,389 --> 00:01:40,240
in addition of being the first mission

43
00:01:44,230 --> 00:01:42,399
to orbit the dwarf planet

44
00:01:46,870 --> 00:01:44,240
dawn represents the first time a

45
00:01:48,069 --> 00:01:46,880
spacecraft actually went to two alien

46
00:01:50,630 --> 00:01:48,079
objects

47
00:01:52,710 --> 00:01:50,640
we had vesta a few years ago and now

48
00:01:55,350 --> 00:01:52,720
we're getting to series this was made

49
00:01:57,990 --> 00:01:55,360
possible by a unique propulsion system

50
00:01:59,670 --> 00:01:58,000
called electric propulsion system

51
00:02:02,230 --> 00:01:59,680
of course we are very excited to arrive

52
00:02:04,870 --> 00:02:02,240
at a series so we can unravel the

53
00:02:06,550 --> 00:02:04,880
mystery of the bright spots that you see

54
00:02:08,949 --> 00:02:06,560
in the pictures

55
00:02:10,630 --> 00:02:08,959
as well as many other features that will

56
00:02:13,430 --> 00:02:10,640
be described to you

57
00:02:16,470 --> 00:02:13,440
in this presentation later every time we

58
00:02:19,110 --> 00:02:16,480
visit a new object be it a planet or a

59
00:02:21,830 --> 00:02:19,120
satellite who are always surprised and

60
00:02:23,589 --> 00:02:21,840
we're looking forward for more surprises

61
00:02:26,309 --> 00:02:23,599
that we are going to

62
00:02:28,229 --> 00:02:26,319
find as we are exploring series uh this

63
00:02:30,309 --> 00:02:28,239

morning you will be seeing images new

64
00:02:32,550 --> 00:02:30,319
images and rotation movies of series

65
00:02:35,589 --> 00:02:32,560
presented by the speakers

66
00:02:37,910 --> 00:02:35,599
don is one of almost 20 missions

67
00:02:40,470 --> 00:02:37,920
than managed by jpl that are exploring

68
00:02:42,949 --> 00:02:40,480
the solar system and beyond we are out

69
00:02:45,589 --> 00:02:42,959
there to answer fundamental questions

70
00:02:47,430 --> 00:02:45,599
about how our solar system originated

71
00:02:49,830 --> 00:02:47,440
and changed over time

72
00:02:52,229 --> 00:02:49,840
so now please join me in welcoming jim

73
00:02:58,790 --> 00:02:52,239
green the director of planetary science

74
00:03:03,430 --> 00:03:00,070
good morning

75
00:03:05,750 --> 00:03:03,440
i am just delighted that don is now

76
00:03:08,149 --> 00:03:05,760
right on the doorstep of series

77
00:03:10,790 --> 00:03:08,159
you know dawn is part of our what we

78
00:03:13,190 --> 00:03:10,800
call discovery program it's one of many

79
00:03:14,149 --> 00:03:13,200
missions that are principal investigator

80
00:03:16,390 --> 00:03:14,159
led

81
00:03:17,910 --> 00:03:16,400
the principal investigator on dawn is

82
00:03:19,509 --> 00:03:17,920
chris russell

83
00:03:21,750 --> 00:03:19,519
from ucla

84
00:03:24,869 --> 00:03:21,760
and chris has put together a fabulous

85
00:03:26,710 --> 00:03:24,879
team both national scientists but also

86
00:03:28,149 --> 00:03:26,720
international team members and

87
00:03:30,789 --> 00:03:28,159
instruments

88
00:03:34,149 --> 00:03:30,799

dawn is just a tremendously exciting

89
00:03:36,229 --> 00:03:34,159
spacecraft and very unique as charles

90
00:03:38,710 --> 00:03:36,239
mentioned it has ion engines and it's

91
00:03:41,589 --> 00:03:38,720
the only one that we've ever launched to

92
00:03:44,149 --> 00:03:41,599
be able to orbit two bodies and in this

93
00:03:47,589 --> 00:03:44,159
case vesta and series

94
00:03:50,309 --> 00:03:47,599
you know dawn is as its name

95
00:03:51,910 --> 00:03:50,319
is not an acronym which is most unusual

96
00:03:54,630 --> 00:03:51,920
here at nasa

97
00:03:57,509 --> 00:03:54,640
dawn really refers to what the mission

98
00:03:58,470 --> 00:03:57,519
is all about and that is going back in

99
00:04:01,509 --> 00:03:58,480
time

100
00:04:04,149 --> 00:04:01,519
visiting the basic remnants

101
00:04:06,070 --> 00:04:04,159
of objects that come together to form

102
00:04:07,030 --> 00:04:06,080
our planets

103
00:04:09,750 --> 00:04:07,040
and so

104
00:04:13,030 --> 00:04:09,760
jupiter's kept these pieces apart it's

105
00:04:14,949 --> 00:04:13,040
allowed us now to get to get to them

106
00:04:17,270 --> 00:04:14,959
and we're going to be able to be really

107
00:04:19,670 --> 00:04:17,280
excited about visiting series and

108
00:04:23,270 --> 00:04:19,680
putting that in context with what we

109
00:04:25,270 --> 00:04:23,280
know about vesta and the other asteroids

110
00:04:27,749 --> 00:04:25,280
so without further ado

111
00:04:30,070 --> 00:04:27,759
let's let me turn it over to robert mace

112
00:04:32,710 --> 00:04:30,080
who's going to talk to us about how dawn

113
00:04:33,590 --> 00:04:32,720

is going to accomplish getting in orbit

114
00:04:35,350 --> 00:04:33,600
bob

115
00:04:37,270 --> 00:04:35,360
all right well thank you jim so good

116
00:04:38,790 --> 00:04:37,280
morning my name is bob mays and i'm

117
00:04:40,790 --> 00:04:38,800
excited to be here today to tell you

118
00:04:42,950 --> 00:04:40,800
about one of the coolest missions to one

119
00:04:44,550 --> 00:04:42,960
of the last unexplored worlds in the

120
00:04:46,390 --> 00:04:44,560
solar system

121
00:04:49,030 --> 00:04:46,400
beyond the orbit of mars but before you

122
00:04:51,590 --> 00:04:49,040
get to jupiter is the main asteroid belt

123
00:04:54,870 --> 00:04:51,600
in a planet you probably never heard of

124
00:04:56,550 --> 00:04:54,880
named ceres it was discovered in 1801

125
00:04:58,950 --> 00:04:56,560
and for many years it was considered a

126
00:05:01,029 --> 00:04:58,960
planet later it was called an asteroid

127
00:05:03,430 --> 00:05:01,039
and more recently it was classified as a

128
00:05:06,310 --> 00:05:03,440
dwarf planet and while it may be labeled

129
00:05:09,110 --> 00:05:06,320
as a dwarf at 600 miles across it's the

130
00:05:10,870 --> 00:05:09,120
giant of the main asteroid belt

131
00:05:13,670 --> 00:05:10,880
behind me is one of the best images that

132
00:05:15,590 --> 00:05:13,680
we have of this mysterious world this

133
00:05:17,670 --> 00:05:15,600
was taken just a few days ago with the

134
00:05:19,830 --> 00:05:17,680
dawn spacecraft

135
00:05:20,790 --> 00:05:19,840
now don's mission is to explore this icy

136
00:05:23,350 --> 00:05:20,800
world

137
00:05:24,870 --> 00:05:23,360
we launched back in 2007 and for the

138
00:05:27,110 --> 00:05:24,880

last seven and a half years we've been

139
00:05:28,390 --> 00:05:27,120
traveling to get to series and later

140
00:05:30,469 --> 00:05:28,400
this week

141
00:05:32,790 --> 00:05:30,479
we'll be captured into orbit and become

142
00:05:34,150 --> 00:05:32,800
the first mission to reach a dwarf

143
00:05:36,230 --> 00:05:34,160
planet

144
00:05:39,189 --> 00:05:36,240
the capture will occur early on the

145
00:05:41,749 --> 00:05:39,199
morning friday march the 6th about 4 20

146
00:05:43,510 --> 00:05:41,759
a.m local time

147
00:05:44,790 --> 00:05:43,520
now the capture itself will occur at a

148
00:05:46,790 --> 00:05:44,800
time when the spacecraft is not

149
00:05:48,469 --> 00:05:46,800
communicating with the earth

150
00:05:50,469 --> 00:05:48,479
but several hours later

151
00:05:52,390 --> 00:05:50,479
the spacecraft will send a signal in the

152
00:05:54,230 --> 00:05:52,400
deep space network of ground antennas

153
00:05:58,390 --> 00:05:54,240
will receive that signal and confirm

154
00:05:59,670 --> 00:05:58,400
that indeed dawn has captured into orbit

155
00:06:01,350 --> 00:05:59,680
so today i'll give you a little

156
00:06:02,469 --> 00:06:01,360
background on dawn and tell you how we

157
00:06:04,230 --> 00:06:02,479
got here

158
00:06:06,469 --> 00:06:04,240
and then carol raymond

159
00:06:08,550 --> 00:06:06,479
will show you some of the latest images

160
00:06:10,950 --> 00:06:08,560
describe how describe the science and

161
00:06:13,510 --> 00:06:10,960
what we hope to learn at series

162
00:06:15,749 --> 00:06:13,520
now to get there is no small feat ceres

163
00:06:17,990 --> 00:06:15,759

is about three times farther from the

164
00:06:19,670 --> 00:06:18,000
sun than the earth is

165
00:06:21,430 --> 00:06:19,680
so to capture enough energy at those

166
00:06:24,070 --> 00:06:21,440
great distances dawn has these

167
00:06:26,710 --> 00:06:24,080
tremendously long solar arrays

168
00:06:28,550 --> 00:06:26,720
the wingspan is about 65 feet from tip

169
00:06:30,150 --> 00:06:28,560
to tip it's about the distance from

170
00:06:32,469 --> 00:06:30,160
pitcher's mound to home plate on a

171
00:06:34,070 --> 00:06:32,479
professional baseball diamond that makes

172
00:06:36,469 --> 00:06:34,080
dawn at the time the largest

173
00:06:38,150 --> 00:06:36,479
interplanetary spacecraft that nasa had

174
00:06:40,710 --> 00:06:38,160
launched

175
00:06:41,990 --> 00:06:40,720
and our journey is made possible by ion

176
00:06:43,670 --> 00:06:42,000
propulsion

177
00:06:45,590 --> 00:06:43,680
now this advanced sounding technology

178
00:06:47,510 --> 00:06:45,600
has actually been around in concept for

179
00:06:50,230 --> 00:06:47,520
decades you've probably heard it in

180
00:06:51,670 --> 00:06:50,240
science fiction and star wars and star

181
00:06:53,749 --> 00:06:51,680
trek

182
00:06:56,710 --> 00:06:53,759
and while we're deeply saddened at the

183
00:06:58,230 --> 00:06:56,720
loss of one of our favorite actors it

184
00:07:00,710 --> 00:06:58,240
was mr spock

185
00:07:03,110 --> 00:07:00,720
who pointed out the alien ship with the

186
00:07:05,189 --> 00:07:03,120
advanced impropulsion technology that

187
00:07:08,790 --> 00:07:05,199
was far more advanced than anything that

188
00:07:12,950 --> 00:07:11,110

so as we roll the first animation

189
00:07:13,990 --> 00:07:12,960
you'll see that this hyper-efficient ion

190
00:07:16,309 --> 00:07:14,000
engine

191
00:07:18,550 --> 00:07:16,319
emits a really cool blue glow this is

192
00:07:19,909 --> 00:07:18,560
due to the xenon gas that's used as a

193
00:07:22,309 --> 00:07:19,919
propellant

194
00:07:23,830 --> 00:07:22,319
the atoms are ionized and accelerated

195
00:07:25,510 --> 00:07:23,840
out the thruster at extremely high

196
00:07:27,350 --> 00:07:25,520
velocities

197
00:07:28,469 --> 00:07:27,360
now the ion engines produce very low

198
00:07:30,070 --> 00:07:28,479
thrust

199
00:07:32,390 --> 00:07:30,080
about as much as this piece of paper

200
00:07:33,830 --> 00:07:32,400
pushing down on my hand

201
00:07:35,670 --> 00:07:33,840
which to put it in terms that we can

202
00:07:37,830 --> 00:07:35,680
relate to we go from zero to sixty in

203
00:07:40,790 --> 00:07:37,840
about four days

204
00:07:43,270 --> 00:07:40,800
however ion engines are about ten times

205
00:07:45,510 --> 00:07:43,280
more efficient than than conventional

206
00:07:48,309 --> 00:07:45,520
chemical systems and we can continue to

207
00:07:50,710 --> 00:07:48,319
thrust and accelerate for days and weeks

208
00:07:53,430 --> 00:07:50,720
and months or as dawn has now for more

209
00:07:55,189 --> 00:07:53,440
than five years to generate tremendous

210
00:07:57,189 --> 00:07:55,199
velocities

211
00:07:59,189 --> 00:07:57,199
so with the thousand pounds of xenon

212
00:08:01,990 --> 00:07:59,199
propellant that was loaded on board don

213
00:08:05,270 --> 00:08:02,000

has already accomplished more than 24

214
00:08:07,430 --> 00:08:05,280
000 miles per hour of velocity change

215
00:08:09,029 --> 00:08:07,440
now to put that in context that's more

216
00:08:10,550 --> 00:08:09,039
than it takes to get a vehicle from the

217
00:08:13,189 --> 00:08:10,560
surface of the earth up to the

218
00:08:15,510 --> 00:08:13,199
international space station

219
00:08:18,309 --> 00:08:15,520
this iron propulsion enables us to do

220
00:08:20,869 --> 00:08:18,319
things and go places that would be

221
00:08:22,790 --> 00:08:20,879
either extremely expensive or completely

222
00:08:24,629 --> 00:08:22,800
impossible to do

223
00:08:26,790 --> 00:08:24,639
so don really capitalizes on this

224
00:08:30,629 --> 00:08:26,800
innovative technology to deliver big

225
00:08:33,909 --> 00:08:32,149
so now dawn and series are each

226
00:08:35,269 --> 00:08:33,919
traveling around the sun at thousands of

227
00:08:36,870 --> 00:08:35,279
miles per hour

228
00:08:39,430 --> 00:08:36,880
but relative to each other they appear

229
00:08:41,350 --> 00:08:39,440
to be moving very slowly as we roll the

230
00:08:43,029 --> 00:08:41,360
next video

231
00:08:45,269 --> 00:08:43,039
you'll be able to see the spacecraft

232
00:08:47,590 --> 00:08:45,279
ease up next to series and be gently

233
00:08:49,509 --> 00:08:47,600
captured into orbit

234
00:08:51,990 --> 00:08:49,519
at its closest approach

235
00:08:54,470 --> 00:08:52,000
don is within about 25 000 miles of

236
00:08:57,350 --> 00:08:54,480
series that's about 10 times closer than

237
00:08:59,269 --> 00:08:57,360
the moon is to the earth

238
00:09:00,389 --> 00:08:59,279

then over the next month we'll reshape

239
00:09:01,990 --> 00:09:00,399
the orbit

240
00:09:03,829 --> 00:09:02,000
and we'll get ready to begin the prime

241
00:09:06,150 --> 00:09:03,839
science phase

242
00:09:08,470 --> 00:09:06,160
so note that the spacecraft approached

243
00:09:10,389 --> 00:09:08,480
on the lit side of the planet and then

244
00:09:11,990 --> 00:09:10,399
went over to the dark side

245
00:09:13,590 --> 00:09:12,000
so we've been taking images over the

246
00:09:15,829 --> 00:09:13,600
last several weeks this series was

247
00:09:17,509 --> 00:09:15,839
nicely lit up in front of us

248
00:09:18,870 --> 00:09:17,519
however we're now on the dark side so

249
00:09:20,710 --> 00:09:18,880
we're going to have a blackout for about

250
00:09:22,870 --> 00:09:20,720
the next month until we get back over

251
00:09:24,230 --> 00:09:22,880
towards the lit side of the body

252
00:09:25,990 --> 00:09:24,240
but then the floodgates are really going

253
00:09:29,590 --> 00:09:26,000
to open when we get to our first science

254
00:09:32,949 --> 00:09:31,430
now if we can roll the third animation

255
00:09:35,509 --> 00:09:32,959
you'll see that once the prime science

256
00:09:36,470 --> 00:09:35,519
campaign begins the mission profile will

257
00:09:38,150 --> 00:09:36,480
alternate

258
00:09:40,230 --> 00:09:38,160
between taking data with all of our

259
00:09:43,430 --> 00:09:40,240
instruments and using the ion engine to

260
00:09:45,269 --> 00:09:43,440
spiral down to lower and lower orbits

261
00:09:46,870 --> 00:09:45,279
our mission designers have planned a

262
00:09:49,590 --> 00:09:46,880
sequence of four

263
00:09:52,070 --> 00:09:49,600

lower and lower orbits and we'll get to

264
00:09:55,269 --> 00:09:52,080
our final orbit in december of this year

265
00:09:56,949 --> 00:09:55,279
at just 235 miles above the surface

266
00:09:58,470 --> 00:09:56,959
again for context that's just a little

267
00:10:00,550 --> 00:09:58,480
bit lower than the international space

268
00:10:02,550 --> 00:10:00,560
station orbits around the earth

269
00:10:05,350 --> 00:10:02,560
so from this vantage point don will

270
00:10:08,310 --> 00:10:05,360
acquire its most its highest detail and

271
00:10:10,069 --> 00:10:08,320
highest resolution images of the surface

272
00:10:12,710 --> 00:10:10,079
the prime science campaign will last

273
00:10:14,630 --> 00:10:12,720
through june of 2016 which will provide

274
00:10:17,430 --> 00:10:14,640
enough time for don to accomplish all of

275
00:10:19,110 --> 00:10:17,440
its scientific objectives

276
00:10:20,790 --> 00:10:19,120
so to wrap up the spacecraft's in

277
00:10:23,670 --> 00:10:20,800
excellent condition

278
00:10:25,670 --> 00:10:23,680
the approach has gone flawlessly so far

279
00:10:27,829 --> 00:10:25,680
and our outstanding team has done on

280
00:10:30,470 --> 00:10:27,839
course and on schedule for its

281
00:10:31,750 --> 00:10:30,480
rendezvous series

282
00:10:33,750 --> 00:10:31,760
so i'll now hand you over to carol

283
00:10:35,509 --> 00:10:33,760
raymond to explain the significance of

284
00:10:37,030 --> 00:10:35,519
this mysterious world that we're about

285
00:10:38,069 --> 00:10:37,040
to explore

286
00:10:40,790 --> 00:10:38,079
carol

287
00:10:43,110 --> 00:10:40,800
thank you bob good morning everybody

288
00:10:45,590 --> 00:10:43,120

wow series has really surprised us and

289
00:10:47,910 --> 00:10:45,600
produced the first images have produced

290
00:10:49,750 --> 00:10:47,920
some really puzzling features that's

291
00:10:51,910 --> 00:10:49,760
gotten the team and i think

292
00:10:52,710 --> 00:10:51,920
many people very excited

293
00:10:55,750 --> 00:10:52,720
so

294
00:10:57,269 --> 00:10:55,760
in the first movie that i'm showing

295
00:10:59,350 --> 00:10:57,279
this is a movie that was obtained on

296
00:11:01,590 --> 00:10:59,360
february 19th when the spacecraft

297
00:11:04,069 --> 00:11:01,600
stopped thrusting turned his camera

298
00:11:07,190 --> 00:11:04,079
towards series and and watched series

299
00:11:09,269 --> 00:11:07,200
for a full 9.1 hour rotation it has a

300
00:11:11,509 --> 00:11:09,279
resolution of about four kilometers per

301
00:11:13,910 --> 00:11:11,519
pixel or about two and two point four

302
00:11:16,069 --> 00:11:13,920
two miles per pixel and one of the first

303
00:11:19,110 --> 00:11:16,079
things you notice looking at it stands

304
00:11:21,030 --> 00:11:19,120
out very clearly is how round ceres is

305
00:11:23,350 --> 00:11:21,040
and siri's roundness is one of its

306
00:11:25,829 --> 00:11:23,360
planetary characteristics

307
00:11:27,990 --> 00:11:25,839
we also know that ceres is much lighter

308
00:11:30,470 --> 00:11:28,000
than the rocky planets and so we know it

309
00:11:32,630 --> 00:11:30,480
retained a lot of water and light

310
00:11:34,389 --> 00:11:32,640
volatile elements that were present in

311
00:11:36,790 --> 00:11:34,399
the solar nebula

312
00:11:39,190 --> 00:11:36,800
when ceres was formed

313
00:11:41,509 --> 00:11:39,200

and in this sense it's a lot like the

314
00:11:45,190 --> 00:11:41,519
icy moons of the outer solar system

315
00:11:47,750 --> 00:11:45,200
objects like europa and enceladus

316
00:11:51,430 --> 00:11:47,760
and in contrast bodies like the moon and

317
00:11:53,509 --> 00:11:51,440
vesta have melted and boiled off

318
00:11:57,110 --> 00:11:53,519
the water and the light elements

319
00:11:58,150 --> 00:11:57,120
and leaving them dry and rocky so

320
00:12:00,389 --> 00:11:58,160
as

321
00:12:03,110 --> 00:12:00,399
charles and jim mentioned one of the

322
00:12:05,750 --> 00:12:03,120
prime motivations of the dawn mission is

323
00:12:09,030 --> 00:12:05,760
to examine these building blocks of the

324
00:12:11,509 --> 00:12:09,040
planets vesta and ceres which are

325
00:12:13,829 --> 00:12:11,519
two intact protoplanets from the very

326
00:12:15,829 --> 00:12:13,839
dawn of the solar system so there are

327
00:12:18,069 --> 00:12:15,839
literally fossils that we can

328
00:12:20,230 --> 00:12:18,079
investigate to really understand the

329
00:12:22,550 --> 00:12:20,240
processes that were going on at that

330
00:12:25,430 --> 00:12:22,560
time

331
00:12:27,030 --> 00:12:25,440
in this image mosaic it's a flat map

332
00:12:27,910 --> 00:12:27,040
made from the data that you saw in the

333
00:12:29,990 --> 00:12:27,920
movie

334
00:12:32,629 --> 00:12:30,000
and in the initial views of series we

335
00:12:35,670 --> 00:12:32,639
see many strange features

336
00:12:37,590 --> 00:12:35,680
we see smooth areas some areas that are

337
00:12:41,829 --> 00:12:37,600
chaotically fractured

338
00:12:43,829 --> 00:12:41,839

and we see craters of all sizes

339
00:12:46,790 --> 00:12:43,839
the shapes and the sizes of the craters

340
00:12:49,509 --> 00:12:46,800
will allow us to test the hypothesis

341
00:12:50,949 --> 00:12:49,519
that there is a subsurface ice layer on

342
00:12:52,949 --> 00:12:50,959
series

343
00:12:54,710 --> 00:12:52,959
but of particular interest are the

344
00:12:57,670 --> 00:12:54,720
bright spots

345
00:13:02,629 --> 00:12:57,680
which appear mainly in low latitudes and

346
00:13:08,470 --> 00:13:05,990
in the next graphic we will focus on the

347
00:13:11,590 --> 00:13:08,480
two very bright spots

348
00:13:15,269 --> 00:13:11,600
now um suffice it to say these spots

349
00:13:18,470 --> 00:13:15,279
were extremely surprising to the team um

350
00:13:20,710 --> 00:13:18,480
and and they have been puzzling to

351
00:13:21,990 --> 00:13:20,720
to the team and to uh to everybody who's

352
00:13:24,710 --> 00:13:22,000
seen them

353
00:13:28,230 --> 00:13:24,720
they show up in a 92 kilometer crater

354
00:13:31,110 --> 00:13:28,240
that's about 19 degrees north latitude

355
00:13:32,949 --> 00:13:31,120
the spot in the center is about twice as

356
00:13:35,829 --> 00:13:32,959
bright as the spot on the side of the

357
00:13:37,430 --> 00:13:35,839
crater and as yet it has not been

358
00:13:39,910 --> 00:13:37,440
resolved meaning it's smaller than the

359
00:13:43,269 --> 00:13:39,920
four kilometer pixel size but its

360
00:13:45,189 --> 00:13:43,279
apparent brightness is already off scale

361
00:13:46,230 --> 00:13:45,199
it's consistent with highly reflective

362
00:13:49,750 --> 00:13:46,240
materials

363
00:13:51,110 --> 00:13:49,760

which may contain ice or salts

364
00:13:52,629 --> 00:13:51,120
um so

365
00:13:55,829 --> 00:13:52,639
this extreme brightness was really

366
00:13:57,829 --> 00:13:55,839
unexpected but in 2014 it was reported

367
00:14:00,069 --> 00:13:57,839
that the european space agency's

368
00:14:03,189 --> 00:14:00,079
herschel space observatory had detected

369
00:14:05,030 --> 00:14:03,199
water vapor around ceres coming from two

370
00:14:07,350 --> 00:14:05,040
longitude sectors

371
00:14:10,150 --> 00:14:07,360
this crater is located in one of those

372
00:14:12,790 --> 00:14:10,160
longitude sectors so it might be related

373
00:14:14,949 --> 00:14:12,800
to that water vapor emission

374
00:14:18,389 --> 00:14:14,959
and its association with the impact

375
00:14:19,990 --> 00:14:18,399
crater may indicate that impact heating

376
00:14:22,389 --> 00:14:20,000
resulted in

377
00:14:24,949 --> 00:14:22,399
exposure of underlying ice its

378
00:14:27,269 --> 00:14:24,959
vaporization and perhaps we're seeing a

379
00:14:31,110 --> 00:14:27,279
deposit that was left behind which is

380
00:14:34,069 --> 00:14:31,120
rich in material like salts

381
00:14:36,310 --> 00:14:34,079
the team is really really excited about

382
00:14:37,670 --> 00:14:36,320
this feature because it is unique in the

383
00:14:39,189 --> 00:14:37,680
solar system

384
00:14:40,470 --> 00:14:39,199
and

385
00:14:42,949 --> 00:14:40,480
we will be

386
00:14:45,269 --> 00:14:42,959
revealing is its true nature as we get

387
00:14:47,590 --> 00:14:45,279
closer and closer to the surface so

388
00:14:49,670 --> 00:14:47,600

so the mystery will be solved but it is

389
00:14:51,350 --> 00:14:49,680
one that's really got us on the edge of

390
00:14:53,990 --> 00:14:51,360
our seats

391
00:14:56,310 --> 00:14:54,000
now in the next uh graphic i'll focus on

392
00:14:58,710 --> 00:14:56,320
a large basin which is outlined in the

393
00:15:01,030 --> 00:14:58,720
box here this basin is

394
00:15:03,269 --> 00:15:01,040
about 300 kilometers across

395
00:15:05,030 --> 00:15:03,279
and i focus on this because it looks

396
00:15:07,670 --> 00:15:05,040
rather smooth and we expected the

397
00:15:10,069 --> 00:15:07,680
surface of series would be smooth

398
00:15:12,629 --> 00:15:10,079
especially around the equator because we

399
00:15:14,790 --> 00:15:12,639
expect a subsurface ice layer and at the

400
00:15:15,750 --> 00:15:14,800
temperature of series surface ice can

401
00:15:18,310 --> 00:15:15,760
flow

402
00:15:20,870 --> 00:15:18,320
and over time craters can relax so

403
00:15:23,590 --> 00:15:20,880
basically they they get erased

404
00:15:25,430 --> 00:15:23,600
and this basin has such characteristics

405
00:15:27,110 --> 00:15:25,440
it has a very faint

406
00:15:28,949 --> 00:15:27,120
outline of a rim

407
00:15:30,710 --> 00:15:28,959
it's not as deep as we would expect for

408
00:15:33,509 --> 00:15:30,720
an impact crater

409
00:15:35,910 --> 00:15:33,519
and it actually shows some mounds inside

410
00:15:38,230 --> 00:15:35,920
it has a smooth appearance so this may

411
00:15:40,790 --> 00:15:38,240
be an example of of one of these relaxed

412
00:15:42,389 --> 00:15:40,800
basins we also see similar shallow

413
00:15:45,430 --> 00:15:42,399

craters nearby

414
00:15:48,389 --> 00:15:45,440
and so this may indicate a distinct

415
00:15:50,389 --> 00:15:48,399
a region of distinct geologic processes

416
00:15:52,310 --> 00:15:50,399
and as dawn

417
00:15:54,150 --> 00:15:52,320
goes through as comprehensive mapping

418
00:15:55,910 --> 00:15:54,160
we'll obtain the data that we need to

419
00:15:57,350 --> 00:15:55,920
understand uh what this complex

420
00:15:59,749 --> 00:15:57,360
structure is telling us about the

421
00:16:03,030 --> 00:15:59,759
subsurface

422
00:16:05,269 --> 00:16:03,040
in the next movie i wanted to turn back

423
00:16:07,590 --> 00:16:05,279
to vesta

424
00:16:09,749 --> 00:16:07,600
and give you a couple of highlights

425
00:16:12,310 --> 00:16:09,759
so this movie demonstrates the results

426
00:16:14,790 --> 00:16:12,320
of don's 14-month investigation at vesta

427
00:16:17,590 --> 00:16:14,800
that revealed a complex world giant

428
00:16:19,829 --> 00:16:17,600
impact basins tectonic fracturing a

429
00:16:22,230 --> 00:16:19,839
diversity of surface minerals and

430
00:16:23,990 --> 00:16:22,240
significantly dawn discovered hydrogen

431
00:16:25,670 --> 00:16:24,000
on the surface of this dry rocky

432
00:16:27,350 --> 00:16:25,680
protoplanet

433
00:16:29,990 --> 00:16:27,360
and it's

434
00:16:32,389 --> 00:16:30,000
the hydrogen is associated with dark

435
00:16:34,710 --> 00:16:32,399
carbon rich material which we believe

436
00:16:37,189 --> 00:16:34,720
was delivered to the surface of vesta by

437
00:16:40,389 --> 00:16:37,199
impacts of of wet volatile rich

438
00:16:42,470 --> 00:16:40,399

asteroids asteroids like ceres

439
00:16:45,110 --> 00:16:42,480
so if these asteroids were delivering

440
00:16:47,590 --> 00:16:45,120
volatiles to vesta they also were

441
00:16:50,710 --> 00:16:47,600
delivering those the water to the inner

442
00:16:52,389 --> 00:16:50,720
planets including the earth and this is

443
00:16:54,949 --> 00:16:52,399
one of the connections that we want to

444
00:16:57,030 --> 00:16:54,959
make with the dawn mission

445
00:17:00,389 --> 00:16:57,040
in the next uh video

446
00:17:02,790 --> 00:17:00,399
this demonstrates a flyover of the 68

447
00:17:05,829 --> 00:17:02,800
kilometer marcha crater on vesta where

448
00:17:07,990 --> 00:17:05,839
we saw evidence of gases escaping from

449
00:17:09,829 --> 00:17:08,000
the center of the crater leaving these

450
00:17:12,549 --> 00:17:09,839
telltale pits

451
00:17:15,909 --> 00:17:12,559
and these gas the gas likely water vapor

452
00:17:18,470 --> 00:17:15,919
was released by impact shock heating

453
00:17:20,630 --> 00:17:18,480
releasing that water vape the water from

454
00:17:22,230 --> 00:17:20,640
the the dark material that was buried in

455
00:17:24,309 --> 00:17:22,240
the subsurface

456
00:17:27,510 --> 00:17:24,319
our exploration of series is going to

457
00:17:29,990 --> 00:17:27,520
yield a similar detailed data set from

458
00:17:31,909 --> 00:17:30,000
which we will be able to answer the many

459
00:17:34,390 --> 00:17:31,919
questions that are being raised by the

460
00:17:36,630 --> 00:17:34,400
images we're seeing today

461
00:17:39,190 --> 00:17:36,640
so my last graphic is

462
00:17:41,270 --> 00:17:39,200
another movie which is showing

463
00:17:42,390 --> 00:17:41,280

has been enhanced to show the surface

464
00:17:45,029 --> 00:17:42,400
relief

465
00:17:47,510 --> 00:17:45,039
and over the course of 16 months dawn

466
00:17:48,870 --> 00:17:47,520
will collect comprehensive data sets on

467
00:17:51,990 --> 00:17:48,880
series

468
00:17:55,750 --> 00:17:52,000
revealing its shape surface features

469
00:17:58,549 --> 00:17:55,760
the mineralogy and elemental composition

470
00:18:00,549 --> 00:17:58,559
whether the surface is active today and

471
00:18:03,510 --> 00:18:00,559
how series formed

472
00:18:05,669 --> 00:18:03,520
so we can understand what role building

473
00:18:08,470 --> 00:18:05,679
blocks like ceres had

474
00:18:10,789 --> 00:18:08,480
in forming our planetary neighborhood

475
00:18:12,870 --> 00:18:10,799
it's clear that discoveries lie ahead

476
00:18:15,909 --> 00:18:12,880
a series will be revealed in stunning

477
00:18:17,669 --> 00:18:15,919
detail just like vesta

478
00:18:19,590 --> 00:18:17,679
so now i'll turn it back to jane for

479
00:18:21,909 --> 00:18:19,600
questions

480
00:18:23,590 --> 00:18:21,919
all right thank you carol and bob and

481
00:18:25,510 --> 00:18:23,600
jim and charles

482
00:18:28,470 --> 00:18:25,520
we're going to take questions both from

483
00:18:30,310 --> 00:18:28,480
the auditorium here at jpl and via the

484
00:18:32,150 --> 00:18:30,320
phone lines reporters who are in various

485
00:18:34,070 --> 00:18:32,160
locations

486
00:18:36,390 --> 00:18:34,080
do we have a question here at jpl to

487
00:18:37,430 --> 00:18:36,400
start things off if so please raise your

488
00:18:39,750 --> 00:18:37,440

hand

489
00:18:42,150 --> 00:18:39,760
and wait for the mic to come to you and

490
00:18:44,789 --> 00:18:42,160
when you get the mic state your name and

491
00:18:48,070 --> 00:18:44,799
your media affiliation

492
00:18:53,750 --> 00:18:48,080
so while we're okay let's get a mic over

493
00:18:56,470 --> 00:18:55,110
and i should mention that if you're on

494
00:18:59,350 --> 00:18:56,480
the phone and you would like to ask a

495
00:19:01,510 --> 00:18:59,360
question please press star one so the

496
00:19:03,909 --> 00:19:01,520
operator can get you into the queue

497
00:19:05,510 --> 00:19:03,919
let's go to alicia alicia chang from ap

498
00:19:07,110 --> 00:19:05,520
um robert can you give more details

499
00:19:09,510 --> 00:19:07,120
about friday's timeline when do you

500
00:19:11,350 --> 00:19:09,520
expect to get a signal and do you expect

501
00:19:13,510 --> 00:19:11,360
any kind of dramatic moment during the

502
00:19:14,710 --> 00:19:13,520
orbit capture thanks

503
00:19:16,950 --> 00:19:14,720
all right

504
00:19:18,870 --> 00:19:16,960
um so the question is when will we get

505
00:19:20,150 --> 00:19:18,880
the signal and and what will the moment

506
00:19:22,150 --> 00:19:20,160
be like

507
00:19:23,750 --> 00:19:22,160
so as i described the capture event

508
00:19:25,669 --> 00:19:23,760
itself is going to occur at a time when

509
00:19:27,590 --> 00:19:25,679
the spacecraft's not in communication

510
00:19:29,430 --> 00:19:27,600
with the earth and so there will be

511
00:19:31,190 --> 00:19:29,440
literally nothing to watch at the time

512
00:19:32,950 --> 00:19:31,200
that it happens and so there won't be

513
00:19:34,230 --> 00:19:32,960

the type of

514
00:19:36,470 --> 00:19:34,240
dramatic

515
00:19:39,510 --> 00:19:36,480
mission control room event that you've

516
00:19:41,750 --> 00:19:39,520
perhaps seen on some other missions

517
00:19:43,750 --> 00:19:41,760
and so what will happen is later in the

518
00:19:46,070 --> 00:19:43,760
day later that morning

519
00:19:48,549 --> 00:19:46,080
we'll have a track with the deep space

520
00:19:51,110 --> 00:19:48,559
network the signal come back and so

521
00:19:54,230 --> 00:19:51,120
around early afternoon is one we'll get

522
00:19:55,990 --> 00:19:54,240
the confirmation of signal and really

523
00:19:58,549 --> 00:19:56,000
that'll be the time at which we can say

524
00:20:02,549 --> 00:19:58,559
indeed capture has occurred at the

525
00:20:07,510 --> 00:20:04,390
okay we have a question here in the

526
00:20:09,750 --> 00:20:07,520
second row thank you

527
00:20:11,590 --> 00:20:09,760
hi rod pyle from space.com

528
00:20:13,029 --> 00:20:11,600
excuse me i hate to ask you to speculate

529
00:20:14,789 --> 00:20:13,039
but

530
00:20:16,870 --> 00:20:14,799
what kind of geological activity do you

531
00:20:18,390 --> 00:20:16,880
think we might expect and how much of

532
00:20:21,990 --> 00:20:18,400
that would be due to title forces as

533
00:20:27,029 --> 00:20:24,870
so um first of all we don't there aren't

534
00:20:29,990 --> 00:20:27,039
uh strong tidal forces affecting ceres

535
00:20:31,510 --> 00:20:30,000
um but ceres is much closer to the sun

536
00:20:33,750 --> 00:20:31,520
than

537
00:20:35,350 --> 00:20:33,760
the jupiter moons

538
00:20:39,110 --> 00:20:35,360

or the moons of the outer solar system

539
00:20:41,990 --> 00:20:39,120
so the main energy source is solar

540
00:20:43,750 --> 00:20:42,000
what kind of activity or processes that

541
00:20:45,590 --> 00:20:43,760
we would expect

542
00:20:47,110 --> 00:20:45,600
is as i mentioned before that the the

543
00:20:49,190 --> 00:20:47,120
ice may be

544
00:20:53,430 --> 00:20:49,200
have an ability to flow because it's

545
00:20:55,110 --> 00:20:53,440
warmer than uh than the icy moons and

546
00:20:57,750 --> 00:20:55,120
there is a possibility that there is

547
00:20:59,990 --> 00:20:57,760
some convection within the ice layer

548
00:21:01,990 --> 00:21:00,000
that can be bringing material up from

549
00:21:03,830 --> 00:21:02,000
the rocky core

550
00:21:06,789 --> 00:21:03,840
to the surface so

551
00:21:08,630 --> 00:21:06,799
we are looking for evidence of material

552
00:21:11,510 --> 00:21:08,640
on the surface which appears to have

553
00:21:14,070 --> 00:21:11,520
originated at the um

554
00:21:16,710 --> 00:21:14,080
the water rock boundary that

555
00:21:20,310 --> 00:21:16,720
because we expect there was a subsurface

556
00:21:21,590 --> 00:21:20,320
ocean early on in ceres um and so those

557
00:21:23,270 --> 00:21:21,600
are the the types of things we're

558
00:21:25,029 --> 00:21:23,280
looking for and any kind of

559
00:21:27,830 --> 00:21:25,039
cracking of the surface which might

560
00:21:29,510 --> 00:21:27,840
indicate that there's some communication

561
00:21:31,350 --> 00:21:29,520
between the the subsurface and the

562
00:21:32,470 --> 00:21:31,360
surface

563
00:21:34,230 --> 00:21:32,480

all right we're going to take a question

564
00:21:40,710 --> 00:21:34,240
from the phone lines right now this one

565
00:21:44,149 --> 00:21:42,549
oh yeah hi guys thank you for

566
00:21:45,830 --> 00:21:44,159
for doing this this is this is really

567
00:21:48,230 --> 00:21:45,840
exciting for all of us we're finally

568
00:21:49,590 --> 00:21:48,240
going to get a look at series um and

569
00:21:51,430 --> 00:21:49,600
yeah i mean you mentioned carol that

570
00:21:54,149 --> 00:21:51,440
there were there were plumes kind of

571
00:21:57,430 --> 00:21:54,159
observed on series um

572
00:21:59,029 --> 00:21:57,440
and yeah i mean do you guys have any

573
00:22:00,549 --> 00:21:59,039
make any plans to actually investigate

574
00:22:03,430 --> 00:22:00,559
those plumes or try to confirm them

575
00:22:05,909 --> 00:22:03,440
further can can dawn actually confirm

576
00:22:08,070 --> 00:22:05,919
if there are plumes or or if those perms

577
00:22:09,510 --> 00:22:08,080
were the result of just like a meteorite

578
00:22:10,789 --> 00:22:09,520
impact

579
00:22:12,710 --> 00:22:10,799
so what are your plans going forward

580
00:22:14,710 --> 00:22:12,720
with with that during during your time

581
00:22:16,789 --> 00:22:14,720
in orbit around series

582
00:22:19,350 --> 00:22:16,799
yeah so um

583
00:22:21,669 --> 00:22:19,360
first of all the um

584
00:22:23,590 --> 00:22:21,679
what herschel saw

585
00:22:26,470 --> 00:22:23,600
doesn't necessarily indicate there are

586
00:22:28,710 --> 00:22:26,480
plumes in fact the the rate of water

587
00:22:31,350 --> 00:22:28,720
vapor emission they inferred was was

588
00:22:34,149 --> 00:22:31,360

very low so um

589
00:22:35,510 --> 00:22:34,159
if anything there would be um very faint

590
00:22:38,310 --> 00:22:35,520
um

591
00:22:40,470 --> 00:22:38,320
jets coming from the surface if

592
00:22:42,710 --> 00:22:40,480
they are localized

593
00:22:44,070 --> 00:22:42,720
don's instrumentation is not

594
00:22:49,430 --> 00:22:44,080
um

595
00:22:55,430 --> 00:22:52,149
features or or transient phenomena but

596
00:22:57,190 --> 00:22:55,440
we are using our payload in the um

597
00:22:59,270 --> 00:22:57,200
to do the best job we can to look for

598
00:23:01,909 --> 00:22:59,280
them so we will be making

599
00:23:03,990 --> 00:23:01,919
observations of uh in forward scattered

600
00:23:07,110 --> 00:23:04,000
light to look for dust that's been

601
00:23:09,350 --> 00:23:07,120
levitated from the surface um by um by

602
00:23:13,029 --> 00:23:09,360
gas emission and of course we can use

603
00:23:15,750 --> 00:23:13,039
our ir spectrometer to look for

604
00:23:17,590 --> 00:23:15,760
for water vapor in a tenuous atmosphere

605
00:23:18,950 --> 00:23:17,600
around series so we will be making those

606
00:23:21,909 --> 00:23:18,960
measurements

607
00:23:24,710 --> 00:23:21,919
as we get into our first science orbit

608
00:23:26,230 --> 00:23:24,720
late in april

609
00:23:29,430 --> 00:23:26,240
okay our next question for the phone

610
00:23:31,350 --> 00:23:29,440
lines is from alan boyle at nbc news

611
00:23:32,789 --> 00:23:31,360
good morning alan

612
00:23:34,470 --> 00:23:32,799
good morning

613
00:23:36,950 --> 00:23:34,480

i think this is probably for carol i

614
00:23:39,750 --> 00:23:36,960
wanted to ask about the bright spots

615
00:23:42,870 --> 00:23:39,760
uh it looks as if there's a reflection

616
00:23:45,510 --> 00:23:42,880
that comes straight into siri's camera

617
00:23:47,909 --> 00:23:45,520
uh on the edge and so i guess that's

618
00:23:49,830 --> 00:23:47,919
reflected sunlight but is there

619
00:23:52,549 --> 00:23:49,840
any reason have you figured out the

620
00:23:54,630 --> 00:23:52,559
geometry for that it sounds as if

621
00:23:57,029 --> 00:23:54,640
there really won't be any uh

622
00:23:59,750 --> 00:23:57,039
observations when series is on the dark

623
00:24:02,149 --> 00:23:59,760
side so uh should our expectation be

624
00:24:04,950 --> 00:24:02,159
that there really won't be any imagery

625
00:24:06,870 --> 00:24:04,960
until sometime in april

626
00:24:08,470 --> 00:24:06,880
thank you

627
00:24:11,830 --> 00:24:08,480
yeah that's correct we're not going to

628
00:24:12,710 --> 00:24:11,840
be getting um any new data until

629
00:24:17,029 --> 00:24:12,720
we

630
00:24:20,549 --> 00:24:17,039
dark side of series

631
00:24:23,590 --> 00:24:20,559
so as we get into our first uh science

632
00:24:26,149 --> 00:24:23,600
orbit the rc3 orbit we will be getting

633
00:24:27,029 --> 00:24:26,159
uh better resolution and

634
00:24:30,230 --> 00:24:27,039
and in

635
00:24:32,630 --> 00:24:30,240
in addition we're working on the

636
00:24:34,870 --> 00:24:32,640
correction to the image data to make

637
00:24:37,510 --> 00:24:34,880
sure that we're taking into account um

638
00:24:40,070 --> 00:24:37,520

how the geometry affects how we see

639
00:24:42,390 --> 00:24:40,080
things on the surface so we're still in

640
00:24:43,909 --> 00:24:42,400
early stages of even

641
00:24:45,750 --> 00:24:43,919
you know having a

642
00:24:52,230 --> 00:24:45,760
very accurate picture of what the

643
00:24:56,470 --> 00:24:53,830
all right our next question also by

644
00:24:58,390 --> 00:24:56,480
phone line is from alexander whitsey at

645
00:25:00,470 --> 00:24:58,400
nature

646
00:25:03,110 --> 00:25:00,480
great thanks for taking my question it's

647
00:25:05,269 --> 00:25:03,120
also for carol raymond um i wanted to

648
00:25:08,149 --> 00:25:05,279
ask specifically about the

649
00:25:10,789 --> 00:25:08,159
possibility of cryovolcanism um in these

650
00:25:13,029 --> 00:25:10,799
bright spots the press release from last

651
00:25:16,070 --> 00:25:13,039
week suggested that volcanic processes

652
00:25:18,070 --> 00:25:16,080
might be at play can you just describe

653
00:25:19,909 --> 00:25:18,080
what that cryovolcanism might look like

654
00:25:22,549 --> 00:25:19,919
and how it would differ from for

655
00:25:24,549 --> 00:25:22,559
instance exposing ice from a meteorite

656
00:25:25,830 --> 00:25:24,559
impact

657
00:25:27,750 --> 00:25:25,840
so

658
00:25:39,430 --> 00:25:27,760
a

659
00:25:42,710 --> 00:25:39,440
some sort of

660
00:25:44,549 --> 00:25:42,720
deposit around a central vent or or

661
00:25:47,750 --> 00:25:44,559
a crack

662
00:25:50,549 --> 00:25:47,760
and in in the case of this crater

663
00:25:52,870 --> 00:25:50,559

what we can say is that the brightest

664
00:25:53,909 --> 00:25:52,880
spot is not associated

665
00:25:56,470 --> 00:25:53,919
with

666
00:25:58,310 --> 00:25:56,480
a positive relief feature i.e you know a

667
00:25:59,990 --> 00:25:58,320
mound or a peak

668
00:26:03,190 --> 00:26:00,000
so

669
00:26:05,909 --> 00:26:03,200
it's not cryo a cryo volcano or that

670
00:26:09,590 --> 00:26:05,919
kind of a mechanism is not at the top of

671
00:26:12,470 --> 00:26:11,110
okay we do have more questions from the

672
00:26:14,630 --> 00:26:12,480
phone we'll get to those in just a

673
00:26:16,149 --> 00:26:14,640
second but again if anybody here at jpl

674
00:26:19,190 --> 00:26:16,159
does have a question just raise your

675
00:26:21,590 --> 00:26:19,200
hand and we'll get a mic over to you uh

676
00:26:24,230 --> 00:26:21,600
right now we're going to go to a phone

677
00:26:27,350 --> 00:26:24,240
uh question and that is from robert

678
00:26:29,430 --> 00:26:27,360
holtz at wall street journal

679
00:26:30,789 --> 00:26:29,440
hi thank you for making time for all

680
00:26:32,630 --> 00:26:30,799
this um

681
00:26:35,590 --> 00:26:32,640
i wonder if you could uh

682
00:26:37,990 --> 00:26:35,600
review the background

683
00:26:39,669 --> 00:26:38,000
for me for on on two issues one what's

684
00:26:41,750 --> 00:26:39,679
the current um

685
00:26:44,149 --> 00:26:41,760
state of the evidence for

686
00:26:47,350 --> 00:26:44,159
subsurface ice and and the thought that

687
00:26:51,110 --> 00:26:47,360
there uh was at one time a uh primordial

688
00:26:55,510 --> 00:26:53,110

the question mark

689
00:26:58,310 --> 00:26:55,520
for carol i think yeah the the

690
00:27:01,190 --> 00:26:58,320
we know um we knew before dawn arrived

691
00:27:03,750 --> 00:27:01,200
at series from its shape which was

692
00:27:07,430 --> 00:27:03,760
determined by hubble space telescope

693
00:27:09,190 --> 00:27:07,440
data and the density of series that um

694
00:27:11,269 --> 00:27:09,200
so we know series retained a lot of

695
00:27:15,029 --> 00:27:11,279
volatiles as i mentioned and its shape

696
00:27:18,630 --> 00:27:15,039
is consistent with um the with a

697
00:27:21,990 --> 00:27:18,640
differentiation into a a rocky core and

698
00:27:24,870 --> 00:27:22,000
an ice mantle and if you model the

699
00:27:26,710 --> 00:27:24,880
evolution of series from its accretion

700
00:27:29,669 --> 00:27:26,720
through to the present day

701
00:27:32,070 --> 00:27:29,679
due to moderate

702
00:27:35,190 --> 00:27:32,080
amount of heat producing radioactive

703
00:27:37,430 --> 00:27:35,200
elements it's inevitable that

704
00:27:39,990 --> 00:27:37,440
that ice would have formed would would

705
00:27:41,110 --> 00:27:40,000
have existed as a ocean at some time in

706
00:27:46,149 --> 00:27:41,120
the past

707
00:27:47,590 --> 00:27:46,159
there was ocean in contact with the rock

708
00:27:50,470 --> 00:27:47,600
beneath an ice

709
00:27:53,669 --> 00:27:50,480
cap and that at present it's an ice

710
00:27:56,870 --> 00:27:53,679
layer which is beneath a crust of in

711
00:27:58,549 --> 00:27:56,880
falls and and and dust and clays and and

712
00:28:01,350 --> 00:27:58,559
lag deposit from

713
00:28:05,350 --> 00:28:02,950

okay another question from the phone

714
00:28:08,149 --> 00:28:05,360
lines and this one is from irene klotz

715
00:28:12,870 --> 00:28:10,549
thanks jane um i have two questions the

716
00:28:14,630 --> 00:28:12,880
first one is for carol

717
00:28:17,029 --> 00:28:14,640
um these conditions that you're

718
00:28:19,909 --> 00:28:17,039
describing are um i'm just wondering if

719
00:28:21,190 --> 00:28:19,919
they have any um astrobiological impacts

720
00:28:24,630 --> 00:28:21,200
is ceres

721
00:28:26,789 --> 00:28:24,640
considered a place where um microbial

722
00:28:28,310 --> 00:28:26,799
life might have developed and i have a

723
00:28:30,950 --> 00:28:28,320
follow-up

724
00:28:33,750 --> 00:28:30,960
yeah the answer is yes um

725
00:28:36,070 --> 00:28:33,760
as i said series is a lot like europa

726
00:28:38,870 --> 00:28:36,080
and enceladus it has uh similar

727
00:28:42,710 --> 00:28:38,880
conditions in the past um at the present

728
00:28:46,149 --> 00:28:42,720
time uh it it's not expected that it has

729
00:28:48,070 --> 00:28:46,159
a much of a liquid layer if at all

730
00:28:50,470 --> 00:28:48,080
but certainly in the past its conditions

731
00:28:54,549 --> 00:28:50,480
were very similar and so we do expect

732
00:28:56,549 --> 00:28:54,559
that it had astrobiological potential

733
00:28:57,750 --> 00:28:56,559
thank you and one other plan's question

734
00:29:00,470 --> 00:28:57,760
is

735
00:29:02,950 --> 00:29:00,480
with the with the new horizons um

736
00:29:05,590 --> 00:29:02,960
mission to pluto going to be happening

737
00:29:07,669 --> 00:29:05,600
in a few months from now as well i'm

738
00:29:08,950 --> 00:29:07,679

just wondering if you might be able to

739
00:29:11,430 --> 00:29:08,960
give us some

740
00:29:13,590 --> 00:29:11,440
context for understanding

741
00:29:16,230 --> 00:29:13,600
how to think about these primordial

742
00:29:18,389 --> 00:29:16,240
bodies one obviously closer to the sun

743
00:29:19,990 --> 00:29:18,399
than the other but what the relationship

744
00:29:21,830 --> 00:29:20,000
is between

745
00:29:23,269 --> 00:29:21,840
these various building blocks that are

746
00:29:26,470 --> 00:29:23,279
kind of left scattered throughout the

747
00:29:29,830 --> 00:29:26,480
solar system

748
00:29:32,470 --> 00:29:29,840
yeah so pluto uh is assumed or is

749
00:29:35,909 --> 00:29:32,480
thought to be a corporate belt object

750
00:29:37,430 --> 00:29:35,919
that um originated much farther out in

751
00:29:42,070 --> 00:29:37,440
the solar system

752
00:29:45,830 --> 00:29:42,080
uh relative to ceres which we believe

753
00:29:46,549 --> 00:29:45,840
was formed roughly where it is now

754
00:29:49,029 --> 00:29:46,559
so

755
00:29:51,510 --> 00:29:49,039
in that sense you know ceres being an

756
00:29:52,830 --> 00:29:51,520
inhabitant of the inner solar system was

757
00:29:56,549 --> 00:29:52,840
probably made

758
00:29:58,789 --> 00:29:56,559
of slightly different material and it's

759
00:30:01,350 --> 00:29:58,799
its history is a little bit different

760
00:30:03,590 --> 00:30:01,360
whereas as pluto is a captured object

761
00:30:04,710 --> 00:30:03,600
from from much farther out

762
00:30:07,190 --> 00:30:04,720
however

763
00:30:08,389 --> 00:30:07,200

you know they both are

764
00:30:11,190 --> 00:30:08,399
have a

765
00:30:13,750 --> 00:30:11,200
a dark surface a fairly primitive

766
00:30:15,430 --> 00:30:13,760
composition they're rich in in water and

767
00:30:16,230 --> 00:30:15,440
volatiles

768
00:30:17,110 --> 00:30:16,240
and

769
00:30:20,149 --> 00:30:17,120
they're

770
00:30:21,909 --> 00:30:20,159
large and

771
00:30:24,070 --> 00:30:21,919
have planetary characteristics so in

772
00:30:25,750 --> 00:30:24,080
that sense they are similar

773
00:30:27,669 --> 00:30:25,760
um but i think

774
00:30:30,389 --> 00:30:27,679
you know time is going to tell

775
00:30:31,750 --> 00:30:30,399
as as we investigate these two objects

776
00:30:36,789 --> 00:30:31,760
really what their similarities and

777
00:30:41,430 --> 00:30:38,470
i believe we have a question also from

778
00:30:45,269 --> 00:30:43,029
yeah this is jim green and just wanted

779
00:30:47,190 --> 00:30:45,279
to make a comment on that indeed new

780
00:30:48,950 --> 00:30:47,200
horizons will be flying through the

781
00:30:52,149 --> 00:30:48,960
pluto system

782
00:30:54,950 --> 00:30:52,159
uh on july 14th with the data coming

783
00:30:56,310 --> 00:30:54,960
back several hours later uh actually in

784
00:30:57,750 --> 00:30:56,320
the morning on the

785
00:30:58,549 --> 00:30:57,760
on the 15th

786
00:31:00,389 --> 00:30:58,559
and

787
00:31:03,509 --> 00:31:00,399
we're going to immediately start making

788
00:31:07,029 --> 00:31:03,519

comparisons you know it's

789
00:31:11,909 --> 00:31:07,039
also a substantial body uh although uh

790
00:31:13,909 --> 00:31:11,919
ceres is um uh 950 or so kilometers in

791
00:31:15,909 --> 00:31:13,919
diameter pluto is

792
00:31:19,350 --> 00:31:15,919
more than twice that

793
00:31:22,789 --> 00:31:19,360
it still is um we believe

794
00:31:25,590 --> 00:31:22,799
full of volatiles a lot of water ice

795
00:31:27,430 --> 00:31:25,600
and we're eagerly waiting to see that so

796
00:31:29,350 --> 00:31:27,440
that we can make comparisons and see

797
00:31:33,190 --> 00:31:29,360
what kind of connections there may be as

798
00:31:37,669 --> 00:31:35,590
okay thank you and we've got a couple

799
00:31:40,070 --> 00:31:37,679
more questions on the phone lines and we

800
00:31:40,870 --> 00:31:40,080
will take a few from social media as

801
00:31:43,430 --> 00:31:40,880
well

802
00:31:47,190 --> 00:31:43,440
let me start out though by going to leo

803
00:31:48,870 --> 00:31:47,200
enright on the phone from irish tv

804
00:31:51,269 --> 00:31:48,880
thanks very much jane indeed thank you

805
00:31:54,389 --> 00:31:51,279
for all your years of helping us cover

806
00:31:58,149 --> 00:31:54,399
these uh extraordinary events i had a

807
00:32:01,350 --> 00:31:58,159
couple of questions uh about the white

808
00:32:03,990 --> 00:32:01,360
dots and and the herschel results

809
00:32:06,870 --> 00:32:04,000
it was my impression that the white

810
00:32:10,230 --> 00:32:06,880
blobs seemed to be still lit

811
00:32:11,110 --> 00:32:10,240
right at the terminator uh was that just

812
00:32:21,590 --> 00:32:11,120
a

813
00:32:24,549 --> 00:32:21,600

herschel results

814
00:32:25,430 --> 00:32:24,559
could you explain just a little bit more

815
00:32:31,190 --> 00:32:25,440
how

816
00:32:34,470 --> 00:32:31,200
herschel results do you think that your

817
00:32:36,149 --> 00:32:34,480
instruments would be able to detect

818
00:32:38,149 --> 00:32:36,159
that amount

819
00:32:42,470 --> 00:32:38,159
of water vapor

820
00:32:44,870 --> 00:32:42,480
in a tenuous atmosphere

821
00:32:46,470 --> 00:32:44,880
okay thank you um the on the first

822
00:32:49,269 --> 00:32:46,480
question um

823
00:32:51,909 --> 00:32:49,279
as i said before we're not yet at the

824
00:32:54,549 --> 00:32:51,919
point where we have uh

825
00:32:57,190 --> 00:32:54,559
completely calibrated data

826
00:32:59,590 --> 00:32:57,200
it is somewhat uh

827
00:33:01,029 --> 00:32:59,600
surprising that you see the bright spot

828
00:33:02,549 --> 00:33:01,039
as it's

829
00:33:04,230 --> 00:33:02,559
on the terminator

830
00:33:07,430 --> 00:33:04,240
but we don't know

831
00:33:08,230 --> 00:33:07,440
we don't have accurate slope information

832
00:33:09,509 --> 00:33:08,240
and

833
00:33:11,190 --> 00:33:09,519
we need a lot

834
00:33:13,190 --> 00:33:11,200
we need more details before we can

835
00:33:14,630 --> 00:33:13,200
really understand the significance of

836
00:33:16,470 --> 00:33:14,640
that

837
00:33:18,950 --> 00:33:16,480
so

838
00:33:21,430 --> 00:33:18,960

i'll leave it at that

839
00:33:24,870 --> 00:33:21,440
as far as the herschel

840
00:33:28,149 --> 00:33:24,880
observations they detected a water vapor

841
00:33:29,269 --> 00:33:28,159
emission at six kilometers six kilograms

842
00:33:30,149 --> 00:33:29,279
per second

843
00:33:32,549 --> 00:33:30,159
and

844
00:33:34,630 --> 00:33:32,559
the team has modeled

845
00:33:36,310 --> 00:33:34,640
such an emission coming from a

846
00:33:40,549 --> 00:33:36,320
distributed area

847
00:33:42,310 --> 00:33:40,559
and um is confident that we that our

848
00:33:44,950 --> 00:33:42,320
observations with our infrared

849
00:33:48,070 --> 00:33:44,960
spectrometer at the limb of ceres um

850
00:33:52,470 --> 00:33:48,080
could detect such an emission um if it

851
00:33:56,070 --> 00:33:52,480
were present so we do have the ability

852
00:34:05,190 --> 00:33:56,080
to confirm that observation if that

853
00:34:12,389 --> 00:34:09,750
pi uh this is jim green um indeed um

854
00:34:15,190 --> 00:34:12,399
uh herschel observations were of january

855
00:34:17,109 --> 00:34:15,200
of last year very exciting created quite

856
00:34:20,230 --> 00:34:17,119
the buzz in the scientific community and

857
00:34:23,030 --> 00:34:20,240
of course enhanced our anticipation of

858
00:34:26,869 --> 00:34:23,040
really seeing what ceres is like

859
00:34:29,349 --> 00:34:26,879
now that may mean that ceres is

860
00:34:31,109 --> 00:34:29,359
active for a very short period of time

861
00:34:33,109 --> 00:34:31,119
may mean that

862
00:34:35,750 --> 00:34:33,119
an impact

863
00:34:37,909 --> 00:34:35,760

on series lofted the material and and

864
00:34:39,750 --> 00:34:37,919
herschel was just lucky to see it

865
00:34:41,990 --> 00:34:39,760
what's really important to note is

866
00:34:44,310 --> 00:34:42,000
because of the ion engines that we have

867
00:34:47,030 --> 00:34:44,320
in our ability to get down closer to the

868
00:34:49,190 --> 00:34:47,040
surface of series for a very long period

869
00:34:51,349 --> 00:34:49,200
of time we're going to see a time

870
00:34:54,149 --> 00:34:51,359
evolution of activity if indeed it

871
00:34:55,829 --> 00:34:54,159
exists on series so another dimension

872
00:34:58,630 --> 00:34:55,839
that actually being there really

873
00:35:01,750 --> 00:34:58,640
provides us that that really exciting

874
00:35:03,670 --> 00:35:01,760
set of observations to interpret

875
00:35:05,190 --> 00:35:03,680
thank you jim and i believe dawn

876
00:35:06,630 --> 00:35:05,200
principal investigator chris russell

877
00:35:09,670 --> 00:35:06,640
would like to say something

878
00:35:11,430 --> 00:35:09,680
to follow up on the

879
00:35:13,589 --> 00:35:11,440
observations of the light at the

880
00:35:16,470 --> 00:35:13,599
terminator we have followed the light

881
00:35:19,270 --> 00:35:16,480
curve into the terminator the spots do

882
00:35:22,069 --> 00:35:19,280
get darker and then go out when the

883
00:35:24,230 --> 00:35:22,079
terminator is reached

884
00:35:25,829 --> 00:35:24,240
thank you very much

885
00:35:27,750 --> 00:35:25,839
again if anybody in the room has a

886
00:35:31,750 --> 00:35:27,760
question raise your hand and we'll get a

887
00:35:34,069 --> 00:35:31,760
mic over to you we will take a couple of

888
00:35:36,390 --> 00:35:34,079

social media questions but first i'm

889
00:35:39,030 --> 00:35:36,400
going to go to kelly beatty sky and

890
00:35:40,790 --> 00:35:39,040
telescope who's on the phone with us

891
00:35:44,150 --> 00:35:40,800
hey thanks very much this is a question

892
00:35:46,230 --> 00:35:44,160
for bob having to do with trajectories

893
00:35:48,390 --> 00:35:46,240
so eventually you'll you'll be able to

894
00:35:50,069 --> 00:35:48,400
get a really accurate mass and maybe

895
00:35:51,670 --> 00:35:50,079
some internal structure from the orbit

896
00:35:53,109 --> 00:35:51,680
and the orbital tracking but how soon

897
00:35:53,829 --> 00:35:53,119
will you have

898
00:36:15,030 --> 00:35:53,839
a

899
00:36:18,150 --> 00:36:15,040
just slowly build up knowledge over time

900
00:36:19,990 --> 00:36:18,160
as we continue to get closer so already

901
00:36:22,710 --> 00:36:20,000
they're beginning to sense the gravity

902
00:36:24,069 --> 00:36:22,720
field of series and beginning to refine

903
00:36:25,670 --> 00:36:24,079
our our

904
00:36:27,190 --> 00:36:25,680
estimates that we had before we got

905
00:36:29,190 --> 00:36:27,200
there of what it is

906
00:36:30,870 --> 00:36:29,200
and our estimates will just continue to

907
00:36:32,710 --> 00:36:30,880
improve and improve and improve

908
00:36:33,829 --> 00:36:32,720
basically the closer that we get to the

909
00:36:36,150 --> 00:36:33,839
body

910
00:36:38,069 --> 00:36:36,160
so we're already starting to refine the

911
00:36:39,990 --> 00:36:38,079
mass a little bit once we get into our

912
00:36:41,750 --> 00:36:40,000
first science orbit obviously that will

913
00:36:43,910 --> 00:36:41,760

be a significant improvement and then as

914
00:36:44,950 --> 00:36:43,920
we go to each subsequent orbit it will

915
00:36:47,030 --> 00:36:44,960
improve

916
00:36:48,870 --> 00:36:47,040
much further from there

917
00:36:50,069 --> 00:36:48,880
and so to the second part of your

918
00:36:52,390 --> 00:36:50,079
question

919
00:36:54,550 --> 00:36:52,400
don will get down to its lowest orbit

920
00:36:56,470 --> 00:36:54,560
and the plan is for the spacecraft to

921
00:36:58,870 --> 00:36:56,480
stay there indefinitely and that's

922
00:36:59,990 --> 00:36:58,880
that's where the mission would end

923
00:37:01,030 --> 00:37:00,000
um

924
00:37:03,430 --> 00:37:01,040
the

925
00:37:05,670 --> 00:37:03,440
orbit is designed such that it's stable

926
00:37:07,430 --> 00:37:05,680
for a very long period of time so don

927
00:37:11,109 --> 00:37:07,440
will actually stay in that orbit for on

928
00:37:15,430 --> 00:37:12,710
okay we're going to take a question from

929
00:37:17,910 --> 00:37:15,440
social media via twitter brianna is

930
00:37:19,670 --> 00:37:17,920
asking and here's a question one or a

931
00:37:22,230 --> 00:37:19,680
couple of you might want to take a stab

932
00:37:25,910 --> 00:37:22,240
at what has the journey been like for

933
00:37:26,790 --> 00:37:25,920
team members to this point

934
00:37:31,109 --> 00:37:26,800
okay

935
00:37:33,750 --> 00:37:31,119
it's been a roller coaster ride it's

936
00:37:35,750 --> 00:37:33,760
it's been extremely thrilling um at the

937
00:37:37,589 --> 00:37:35,760
same time it's been a very long ride the

938
00:37:39,670 --> 00:37:37,599

mission uh began

939
00:37:41,670 --> 00:37:39,680
more than 15 years ago when it was

940
00:37:43,190 --> 00:37:41,680
conceived it was built it was launched

941
00:37:45,270 --> 00:37:43,200
was a very exciting moment and we've

942
00:37:47,430 --> 00:37:45,280
been you know traveling in space now for

943
00:37:49,430 --> 00:37:47,440
more than seven and a half years there's

944
00:37:52,310 --> 00:37:49,440
been a lot of people that have worked on

945
00:37:53,270 --> 00:37:52,320
on the project over that time and

946
00:37:57,349 --> 00:37:53,280
it's been

947
00:37:59,109 --> 00:37:57,359
the people along the way is probably one

948
00:38:01,109 --> 00:37:59,119
of the most exciting things about it

949
00:38:02,470 --> 00:38:01,119
they've done a tremendous job there's a

950
00:38:04,870 --> 00:38:02,480
lot of people that had to get it built

951
00:38:07,030 --> 00:38:04,880
to get it launched and to fly it

952
00:38:08,630 --> 00:38:07,040
they all do great work and i would say

953
00:38:10,630 --> 00:38:08,640
for me that's probably the most exciting

954
00:38:12,470 --> 00:38:10,640
part is working with a first-rate

955
00:38:14,550 --> 00:38:12,480
fantastic team that gets all of this

956
00:38:16,950 --> 00:38:14,560
stuff done

957
00:38:22,950 --> 00:38:16,960
carol you may want to offer perspective

958
00:38:28,790 --> 00:38:26,069
okay well uh uh you know uh i can only

959
00:38:31,109 --> 00:38:28,800
say that uh i'm sitting on the edge of

960
00:38:33,829 --> 00:38:31,119
my seat and have been

961
00:38:35,589 --> 00:38:33,839
since dawn was launched in 2006 when i

962
00:38:37,750 --> 00:38:35,599
just became head of the planetary

963
00:38:40,470 --> 00:38:37,760

science division so it's just been a

964
00:38:42,230 --> 00:38:40,480
tremendously exciting journey you know

965
00:38:44,870 --> 00:38:42,240
everything about it from the iron

966
00:38:47,109 --> 00:38:44,880
engines and and how they worked and how

967
00:38:49,349 --> 00:38:47,119
the team has really done a remarkable

968
00:38:51,270 --> 00:38:49,359
job overcoming the engineering

969
00:38:53,270 --> 00:38:51,280
challenges that happen along the way you

970
00:38:54,310 --> 00:38:53,280
know anomalies do occur

971
00:38:56,230 --> 00:38:54,320
and now

972
00:38:58,230 --> 00:38:56,240
we're right at that stage of getting

973
00:39:01,349 --> 00:38:58,240
captured in orbit and seeing a brand new

974
00:39:03,829 --> 00:39:01,359
world for the first time so this is just

975
00:39:06,550 --> 00:39:03,839
uh really an important part of planetary

976
00:39:08,950 --> 00:39:06,560
science they're going to uncover some uh

977
00:39:10,870 --> 00:39:08,960
fabulous things for us to be able to

978
00:39:12,710 --> 00:39:10,880
think about and and we'll have some

979
00:39:15,430 --> 00:39:12,720
answers right away and it'll take maybe

980
00:39:17,589 --> 00:39:15,440
years before we actually figure out the

981
00:39:19,750 --> 00:39:17,599
puzzle of how dawn and and of course

982
00:39:21,910 --> 00:39:19,760
vesta fit into the to the building

983
00:39:24,230 --> 00:39:21,920
blocks of our solar system

984
00:39:27,750 --> 00:39:24,240
just an exciting uh

985
00:39:31,990 --> 00:39:29,829
thank you and our next question is from

986
00:39:33,349 --> 00:39:32,000
ken kramer america space and he's on the

987
00:39:35,829 --> 00:39:33,359
phone

988
00:39:37,190 --> 00:39:35,839

hi thanks for taking my question and um

989
00:39:40,069 --> 00:39:37,200
good luck to everybody it is very

990
00:39:41,750 --> 00:39:40,079
exciting so um my question is um from

991
00:39:44,310 --> 00:39:41,760
the data that you have so far from the

992
00:39:46,710 --> 00:39:44,320
images you have so far i wonder if you

993
00:39:48,710 --> 00:39:46,720
see any surface changes or any changes

994
00:39:51,589 --> 00:39:48,720
in these bright spots

995
00:39:53,670 --> 00:39:51,599
and i'm also wondering um why

996
00:39:57,270 --> 00:39:53,680
if if you can speculate why are these

997
00:39:59,030 --> 00:39:57,280
bright spots only inside the craters not

998
00:40:00,870 --> 00:39:59,040
outside and will you be looking for

999
00:40:04,710 --> 00:40:00,880
plumes with the cameras

1000
00:40:06,790 --> 00:40:04,720
uh not just with the ir thank you

1001
00:40:09,030 --> 00:40:06,800
okay so uh first off we have not seen

1002
00:40:11,349 --> 00:40:09,040
any changes in the images that we've

1003
00:40:14,069 --> 00:40:11,359
taken thus far

1004
00:40:17,589 --> 00:40:14,079
the very bright spots as i discussed are

1005
00:40:18,790 --> 00:40:17,599
located inside of a crater but there are

1006
00:40:21,109 --> 00:40:18,800
other bright

1007
00:40:22,550 --> 00:40:21,119
regions or bright bright spots on vesta

1008
00:40:25,190 --> 00:40:22,560
which

1009
00:40:28,630 --> 00:40:25,200
show raid structures

1010
00:40:31,670 --> 00:40:28,640
emanating from a central crater

1011
00:40:36,470 --> 00:40:31,680
and some spots that may not be related

1012
00:40:39,109 --> 00:40:36,480
directly to a crater so there are other

1013
00:40:43,270 --> 00:40:39,119

types of features which show brightness

1014
00:40:45,750 --> 00:40:43,280
variations but none as bright as the uh

1015
00:40:49,190 --> 00:40:45,760
spots within that crater

1016
00:40:52,630 --> 00:40:49,200
and then as far as a last question um

1017
00:40:54,710 --> 00:40:52,640
we are looking for as i mentioned

1018
00:40:57,349 --> 00:40:54,720
any dust levitating from the surface

1019
00:41:00,150 --> 00:40:57,359
which would have been lifted by gases

1020
00:41:01,990 --> 00:41:00,160
coming coming out of ceres

1021
00:41:04,950 --> 00:41:02,000
and so we are looking for those with the

1022
00:41:09,430 --> 00:41:06,790
we're going to take another social media

1023
00:41:11,430 --> 00:41:09,440
question from twitter space references

1024
00:41:13,430 --> 00:41:11,440
has the question that i believe has not

1025
00:41:15,829 --> 00:41:13,440
been touched on yet today how is the

1026
00:41:17,990 --> 00:41:15,839
hypothesis that ceres has a very thin

1027
00:41:23,109 --> 00:41:18,000
atmosphere doing too early to find out

1028
00:41:25,910 --> 00:41:24,230
um

1029
00:41:27,990 --> 00:41:25,920
well what i was discussing about the

1030
00:41:31,109 --> 00:41:28,000
herschel results is the first

1031
00:41:33,829 --> 00:41:31,119
confirmation of the hypothesis of a

1032
00:41:36,950 --> 00:41:33,839
tenuous atmosphere which was made

1033
00:41:37,750 --> 00:41:36,960
you know a decade earlier based on

1034
00:41:39,349 --> 00:41:37,760
some

1035
00:41:40,710 --> 00:41:39,359
international ultraviolet explorer

1036
00:41:43,190 --> 00:41:40,720
results

1037
00:41:45,829 --> 00:41:43,200
where some water vapor

1038
00:41:46,790 --> 00:41:45,839

emission was detected at least tenuously

1039
00:41:51,190 --> 00:41:46,800
so

1040
00:41:53,910 --> 00:41:51,200
is still very much on the table

1041
00:41:57,030 --> 00:41:53,920
and uh you know obviously we're we're

1042
00:41:59,109 --> 00:41:57,040
keen to see if we can add any um any

1043
00:42:00,950 --> 00:41:59,119
information to

1044
00:42:03,510 --> 00:42:00,960
confirm it

1045
00:42:05,589 --> 00:42:03,520
thank you and we have a follow-up

1046
00:42:07,829 --> 00:42:05,599
question now from irene klotz at

1047
00:42:10,230 --> 00:42:07,839
discover irene

1048
00:42:12,069 --> 00:42:10,240
thank you um i'm recording the end of

1049
00:42:14,710 --> 00:42:12,079
the mission i was just wondering what

1050
00:42:17,030 --> 00:42:14,720
the limiting commodity is is it

1051
00:42:19,910 --> 00:42:17,040
funding for scientists or

1052
00:42:21,670 --> 00:42:19,920
if the satellite can stay in orbit for

1053
00:42:23,829 --> 00:42:21,680
hundreds of years so

1054
00:42:26,150 --> 00:42:23,839
what would be the end of mission

1055
00:42:27,829 --> 00:42:26,160
and also if you have an overall cost of

1056
00:42:31,109 --> 00:42:27,839
the mission

1057
00:42:34,630 --> 00:42:31,119
i guess from from launch through the uh

1058
00:42:37,430 --> 00:42:34,640
nominal end of mission in 2016. thanks

1059
00:42:39,270 --> 00:42:37,440
okay so i'll take that one so i'll

1060
00:42:41,510 --> 00:42:39,280
answer the second question first was

1061
00:42:42,630 --> 00:42:41,520
first which is the dawn life cycle costs

1062
00:42:44,390 --> 00:42:42,640
and that's all the way from the

1063
00:42:46,150 --> 00:42:44,400

beginning of the project through launch

1064
00:42:49,589 --> 00:42:46,160
all the way to the end of the mission is

1065
00:42:51,030 --> 00:42:49,599
about 473 million dollars

1066
00:42:54,309 --> 00:42:51,040
which is jim

1067
00:42:56,710 --> 00:42:54,319
uh described earlier as part of the

1068
00:42:58,790 --> 00:42:56,720
discover program discovery program it's

1069
00:43:01,670 --> 00:42:58,800
a low-cost mission

1070
00:43:02,870 --> 00:43:01,680
so the question um about the orbit the

1071
00:43:03,990 --> 00:43:02,880
thing that will

1072
00:43:06,710 --> 00:43:04,000
end

1073
00:43:08,950 --> 00:43:06,720
don's lifetime will likely be the amount

1074
00:43:10,230 --> 00:43:08,960
of hydrazine that we have in the tanks

1075
00:43:12,309 --> 00:43:10,240
which we use

1076
00:43:13,990 --> 00:43:12,319
for attitude control or for pointing the

1077
00:43:15,109 --> 00:43:14,000
spacecraft

1078
00:43:17,030 --> 00:43:15,119
so

1079
00:43:18,870 --> 00:43:17,040
we use it all of the time to point the

1080
00:43:20,550 --> 00:43:18,880
spacecraft towards the planet so that we

1081
00:43:22,630 --> 00:43:20,560
can take images to point it back to

1082
00:43:24,230 --> 00:43:22,640
earth so that we can relay all that data

1083
00:43:26,470 --> 00:43:24,240
back down to earth

1084
00:43:28,390 --> 00:43:26,480
we've got plenty of hydrazine to get us

1085
00:43:29,750 --> 00:43:28,400
through our prime mission however that's

1086
00:43:32,550 --> 00:43:29,760
the resource that we're probably the

1087
00:43:34,550 --> 00:43:32,560
most scarce on um in an extended mission

1088
00:43:35,750 --> 00:43:34,560

kind of time frame so

1089
00:43:37,750 --> 00:43:35,760
don will

1090
00:43:39,030 --> 00:43:37,760
probably last for several months after

1091
00:43:42,069 --> 00:43:39,040
the end of the prime mission but we

1092
00:43:49,430 --> 00:43:42,079
don't have the likely prospect of years

1093
00:43:56,069 --> 00:43:52,309
yes this is uh jim green and indeed as

1094
00:44:02,390 --> 00:43:58,150
we have to get through our prime mission

1095
00:44:04,470 --> 00:44:02,400
uh the indeed the hydrazine is the most

1096
00:44:06,550 --> 00:44:04,480
precious commodity

1097
00:44:07,430 --> 00:44:06,560
and and it'll be in orbit at least the

1098
00:44:09,430 --> 00:44:07,440
year

1099
00:44:11,430 --> 00:44:09,440
then we'll take stock at

1100
00:44:13,109 --> 00:44:11,440
how much is left what are the new

1101
00:44:15,589 --> 00:44:13,119
questions we need to answer and whether

1102
00:44:17,430 --> 00:44:15,599
don is in a position to answer it and

1103
00:44:19,670 --> 00:44:17,440
then we would go through a process of

1104
00:44:21,829 --> 00:44:19,680
that evaluation and then

1105
00:44:24,069 --> 00:44:21,839
give them the go-ahead

1106
00:44:27,589 --> 00:44:24,079
but it would have been wonderful if

1107
00:44:29,750 --> 00:44:27,599
if indeed it had plenty of hydrazine and

1108
00:44:30,630 --> 00:44:29,760
and would have lasted for two or three

1109
00:44:32,230 --> 00:44:30,640
years

1110
00:44:33,750 --> 00:44:32,240
and that of course is dependent upon

1111
00:44:35,990 --> 00:44:33,760
what it would observe but i'm sure it

1112
00:44:38,790 --> 00:44:36,000
will observe some really exciting things

1113
00:44:41,270 --> 00:44:38,800

we want to see if this uh body is active

1114
00:44:43,030 --> 00:44:41,280
if this dwarf planet is actually goes

1115
00:44:44,150 --> 00:44:43,040
through a period of time where it does

1116
00:44:47,190 --> 00:44:44,160
emit

1117
00:44:50,069 --> 00:44:47,200
uh uh based on impacts or

1118
00:44:52,470 --> 00:44:50,079
or anything else and and

1119
00:44:54,390 --> 00:44:52,480
that would be of importance at that time

1120
00:44:56,470 --> 00:44:54,400
so we'll have to wait and see see what

1121
00:44:59,109 --> 00:44:56,480
the fuel reserves are before we make

1122
00:45:01,589 --> 00:44:59,119
that decision

1123
00:45:03,190 --> 00:45:01,599
okay i want to make just do a quick last

1124
00:45:05,270 --> 00:45:03,200
call make sure i haven't missed anybody

1125
00:45:07,190 --> 00:45:05,280
in the room here at jpl

1126
00:45:09,270 --> 00:45:07,200
and i believe we've taken care of all

1127
00:45:12,470 --> 00:45:09,280
the callers on the phone

1128
00:45:14,630 --> 00:45:12,480
so let's wrap up with one final question

1129
00:45:15,990 --> 00:45:14,640
from social media this one came in via

1130
00:45:17,750 --> 00:45:16,000
ustream

1131
00:45:20,470 --> 00:45:17,760
and this is what elements in this

1132
00:45:23,109 --> 00:45:20,480
hypothetical subsurface ocean would

1133
00:45:26,630 --> 00:45:23,119
allow any water not to freeze something

1134
00:45:30,309 --> 00:45:26,640
like ammonia or salt for example

1135
00:45:33,910 --> 00:45:30,319
yeah a salt would be the the most likely

1136
00:45:36,230 --> 00:45:33,920
element uh ammonia

1137
00:45:38,630 --> 00:45:36,240
is is less likely

1138
00:45:40,790 --> 00:45:38,640

so the the main

1139
00:45:41,750 --> 00:45:40,800
constituent would be sold

1140
00:45:43,750 --> 00:45:41,760
okay

1141
00:45:45,349 --> 00:45:43,760
thank you and with that i'd like to

1142
00:45:47,910 --> 00:45:45,359
thank all our speakers today and

1143
00:45:49,829 --> 00:45:47,920
everybody who came out a reminder that

1144
00:45:52,230 --> 00:45:49,839
all the visuals you saw today during the

1145
00:45:54,870 --> 00:45:52,240
news conference will be replayed right

1146
00:45:59,510 --> 00:45:54,880
afterwards on nasa tv and they are also

1147
00:46:04,550 --> 00:46:02,309
slash dawn in addition this news

1148
00:46:11,430 --> 00:46:04,560
conference will be replayed on nasa tv