
EXIT

1
00:00:08,629 --> 00:00:06,710
hello and welcome to nasa's jet

2
00:00:11,830 --> 00:00:08,639
propulsion laboratory in pasadena

3
00:00:13,910 --> 00:00:11,840
california i'm jari cook of jpl's media

4
00:00:15,990 --> 00:00:13,920
relations office and i'm going to be the

5
00:00:17,590 --> 00:00:16,000
moderator today for our wrap-up news

6
00:00:18,550 --> 00:00:17,600
briefing for the cassini mission to

7
00:00:20,950 --> 00:00:18,560
saturn

8
00:00:23,750 --> 00:00:20,960
about an hour and a half ago a very

9
00:00:25,910 --> 00:00:23,760
early california time we bid farewell to

10
00:00:27,910 --> 00:00:25,920
the intrepid cassini spacecraft it

11
00:00:29,589 --> 00:00:27,920
plunged into the skies of saturn and

12
00:00:31,990 --> 00:00:29,599
ended its mission

13
00:00:33,990 --> 00:00:32,000

to help us understand these last moments

14
00:00:37,270 --> 00:00:34,000
we have some key team members with us

15
00:00:39,110 --> 00:00:37,280
today to share their thoughts

16
00:00:41,350 --> 00:00:39,120
we do have some reporters on the phone

17
00:00:44,229 --> 00:00:41,360
and so if you have questions uh you

18
00:00:45,510 --> 00:00:44,239
should press star one on your telephone

19
00:00:47,910 --> 00:00:45,520
and we're also going to be tracking

20
00:00:51,190 --> 00:00:47,920
questions via social media and you can

21
00:00:53,189 --> 00:00:51,200
use the hashtag asknasa

22
00:00:55,510 --> 00:00:53,199
so to kick us off i'm going to introduce

23
00:00:58,470 --> 00:00:55,520
to you michael watkins he's the director

24
00:01:01,760 --> 00:00:58,480
of jpl and jpl manages the cassini

25
00:01:10,149 --> 00:01:01,770
mission to saturn for nasa

26
00:01:12,870 --> 00:01:10,159
[Applause]

27
00:01:15,350 --> 00:01:12,880
thank you and welcome to jpl

28
00:01:17,910 --> 00:01:15,360
jpl designed built and operated the

29
00:01:19,830 --> 00:01:17,920
cassini spacecraft for nasa

30
00:01:20,630 --> 00:01:19,840
and as you heard about an hour a half

31
00:01:23,109 --> 00:01:20,640
ago

32
00:01:24,630 --> 00:01:23,119
uh transmitted its final signals from

33
00:01:26,789 --> 00:01:24,640
saturn and then became part of the

34
00:01:29,109 --> 00:01:26,799
planet that it had been studying for 14

35
00:01:30,469 --> 00:01:29,119
years after a seven year voyage for 13

36
00:01:31,510 --> 00:01:30,479
years after a seven year voyage to

37
00:01:35,590 --> 00:01:31,520
saturn

38
00:01:37,270 --> 00:01:35,600

but continuing the legend of cassini

39
00:01:38,710 --> 00:01:37,280
it turned that event into an event of

40
00:01:41,350 --> 00:01:38,720
hope

41
00:01:42,390 --> 00:01:41,360
not an end but really a beginning

42
00:01:44,550 --> 00:01:42,400
and

43
00:01:47,830 --> 00:01:44,560
the discoveries that cassini has made

44
00:01:50,069 --> 00:01:47,840
over the past 13 years in orbit

45
00:01:51,510 --> 00:01:50,079
have rewritten the textbooks of saturn

46
00:01:53,670 --> 00:01:51,520
have discovered worlds that could be

47
00:01:56,310 --> 00:01:53,680
habitable and have guaranteed that we

48
00:01:58,230 --> 00:01:56,320
will return to that ringed world

49
00:02:00,469 --> 00:01:58,240
so the fantastic discoveries that

50
00:02:01,429 --> 00:02:00,479
continue to be made with the last set of

51
00:02:03,590 --> 00:02:01,439
ring

52
00:02:05,590 --> 00:02:03,600
crossing orbits and in the in the grand

53
00:02:06,950 --> 00:02:05,600
finale of cassini haven't really even

54
00:02:08,630 --> 00:02:06,960
been studied yet

55
00:02:11,270 --> 00:02:08,640
and as linda spelker and i were joking

56
00:02:14,309 --> 00:02:11,280
earlier the last few seconds of the

57
00:02:16,630 --> 00:02:14,319
cassini mission are our first taste of

58
00:02:19,030 --> 00:02:16,640
the atmosphere of saturn and those last

59
00:02:21,270 --> 00:02:19,040
few seconds might be a number of phd

60
00:02:23,510 --> 00:02:21,280
theses for students to come so even this

61
00:02:25,030 --> 00:02:23,520
last few seconds cassini managed to to

62
00:02:27,750 --> 00:02:25,040
continue

63
00:02:29,190 --> 00:02:27,760

its its rewriting of the textbooks

64
00:02:31,510 --> 00:02:29,200
and its legend

65
00:02:33,670 --> 00:02:31,520
and to talk more about cassini and about

66
00:02:35,830 --> 00:02:33,680
the the planetary program i'd like to

67
00:02:38,140 --> 00:02:35,840
introduce dr thomas zurbukin the head of

68
00:02:48,150 --> 00:02:38,150
the science mission directorate at nasa

69
00:02:52,229 --> 00:02:49,589
while we're here

70
00:02:53,030 --> 00:02:52,239
to discuss a magnificent mission that

71
00:02:55,030 --> 00:02:53,040
had

72
00:02:56,630 --> 00:02:55,040
an amazing end

73
00:02:58,710 --> 00:02:56,640
and i want to do this starting with the

74
00:03:00,869 --> 00:02:58,720
big picture i'd like to ask you to pull

75
00:03:02,550 --> 00:03:00,879
up the first picture

76
00:03:04,550 --> 00:03:02,560
there it is

77
00:03:07,190 --> 00:03:04,560
one of the most

78
00:03:08,710 --> 00:03:07,200
beautiful uh planets we can imagine uh

79
00:03:10,790 --> 00:03:08,720
some of the science actually kind of

80
00:03:12,949 --> 00:03:10,800
borders on sci-fi from time to time we

81
00:03:14,869 --> 00:03:12,959
look at these images that are there are

82
00:03:17,750 --> 00:03:14,879
there and we wonder

83
00:03:20,229 --> 00:03:17,760
wow that is that really how nature is

84
00:03:21,990 --> 00:03:20,239
and yes it is and nature is really

85
00:03:23,670 --> 00:03:22,000
beautiful this image of course taken

86
00:03:26,710 --> 00:03:23,680
roughly a year ago

87
00:03:29,830 --> 00:03:26,720
shows the amazing planet really the

88
00:03:32,630 --> 00:03:29,840

subject of the research that uh this

89
00:03:34,470 --> 00:03:32,640
spacecraft that this is cassini next

90
00:03:36,789 --> 00:03:34,480
picture

91
00:03:46,229 --> 00:03:36,799
this is also cassini

92
00:03:50,149 --> 00:03:48,309
a diverse set of people from all walks

93
00:03:52,470 --> 00:03:50,159
of life you see at the top there the

94
00:03:55,030 --> 00:03:52,480
science team at their uh last meeting

95
00:03:57,509 --> 00:03:55,040
just a few days ago uh waving at the

96
00:03:58,390 --> 00:03:57,519
camera and uh really celebrating what

97
00:04:00,550 --> 00:03:58,400
they're learning and of course

98
00:04:01,429 --> 00:04:00,560
recognizing that they're nowhere near

99
00:04:04,070 --> 00:04:01,439
done

100
00:04:05,830 --> 00:04:04,080
science will go on and more discoveries

101
00:04:07,990 --> 00:04:05,840
will be made with the data not just from

102
00:04:08,869 --> 00:04:08,000
the last day but also from the last

103
00:04:10,630 --> 00:04:08,879
months

104
00:04:13,110 --> 00:04:10,640
you see at the bottom

105
00:04:14,869 --> 00:04:13,120
many members of the engineering team

106
00:04:17,830 --> 00:04:14,879
which of course are really important

107
00:04:21,110 --> 00:04:17,840
part of this as well uh together i've we

108
00:04:22,950 --> 00:04:21,120
added them up close to 5000 or so uh you

109
00:04:25,670 --> 00:04:22,960
know individuals putting their heart and

110
00:04:28,469 --> 00:04:25,680
soul into this magnificent missions this

111
00:04:35,510 --> 00:04:28,479
is ladies and gentlemen cassini

112
00:04:41,189 --> 00:04:38,629
what you don't see there is that these

113
00:04:42,950 --> 00:04:41,199

people are representative of 26

114
00:04:45,189 --> 00:04:42,960
countries or so

115
00:04:47,590 --> 00:04:45,199
and of course you know

116
00:04:49,990 --> 00:04:47,600
that uh at the entire cassini huygens

117
00:04:52,390 --> 00:04:50,000
mission involved three space agency and

118
00:04:55,189 --> 00:04:52,400
i just really want to call out my

119
00:04:57,909 --> 00:04:55,199
colleagues and our friends from our

120
00:04:59,590 --> 00:04:57,919
sister agencies and i want to really uh

121
00:05:01,990 --> 00:04:59,600
welcome you here and thank you for

122
00:05:04,950 --> 00:05:02,000
coming here you're here uh alvaro

123
00:05:07,029 --> 00:05:04,960
jimenez he's a director of science uh my

124
00:05:08,510 --> 00:05:07,039
counterpart at the european space agency

125
00:05:14,790 --> 00:05:08,520
thanks so much

126
00:05:17,110 --> 00:05:14,800
[Applause]

127
00:05:20,310 --> 00:05:17,120
and roberto pasits pakistan the

128
00:05:23,110 --> 00:05:20,320
president of ozzie uh from italy uh a

129
00:05:24,550 --> 00:05:23,120
really important part of this uh design

130
00:05:29,990 --> 00:05:24,560
thanks so much

131
00:05:30,000 --> 00:05:33,189
or grazia

132
00:05:36,550 --> 00:05:34,469
learn a little bit of italian in

133
00:05:39,350 --> 00:05:36,560
switzerland

134
00:05:41,830 --> 00:05:39,360
the rest i forgot

135
00:05:44,390 --> 00:05:41,840
for 35 years uh

136
00:05:47,430 --> 00:05:44,400
you all have come together and worked to

137
00:05:49,430 --> 00:05:47,440
shed light on this most magnificent work

138
00:05:53,270 --> 00:05:49,440

and i would say with the words of a

139
00:05:55,590 --> 00:05:53,280
former governor here we will be back

140
00:05:58,950 --> 00:05:55,600
you know thanks to cassini uh uh that we

141
00:06:01,590 --> 00:05:58,960
now know to be a you know this uh world

142
00:06:04,870 --> 00:06:01,600
that has so many facets to it and many

143
00:06:07,430 --> 00:06:04,880
facets actually we did not expect um

144
00:06:09,510 --> 00:06:07,440
with today's end of this mission we know

145
00:06:12,070 --> 00:06:09,520
now know the planet's moon will remain

146
00:06:14,390 --> 00:06:12,080
pristine so not only did he do science

147
00:06:17,029 --> 00:06:14,400
here at the very end but we protected

148
00:06:19,990 --> 00:06:17,039
science to be done in the future and we

149
00:06:21,670 --> 00:06:20,000
can and will i'm sure over time find

150
00:06:23,909 --> 00:06:21,680
ways to go back to these moons and

151
00:06:24,790 --> 00:06:23,919
explore them because the questions they

152
00:06:28,150 --> 00:06:24,800
have

153
00:06:30,790 --> 00:06:28,160
asked make this ass keep us up at night

154
00:06:32,469 --> 00:06:30,800
questions that are so deep so simple

155
00:06:34,550 --> 00:06:32,479
that every one of us can understand

156
00:06:36,790 --> 00:06:34,560
whether or not we have a phd or some

157
00:06:39,510 --> 00:06:36,800
kind of stem education questions that

158
00:06:41,670 --> 00:06:39,520
are at the heart of an educated kind of

159
00:06:43,350 --> 00:06:41,680
populace of humanity as a whole it's

160
00:06:45,670 --> 00:06:43,360
those kind of questions that will not

161
00:06:47,990 --> 00:06:45,680
have motivated cassini those kind of

162
00:06:50,629 --> 00:06:48,000
questions that will motivate us to go

163
00:06:52,950 --> 00:06:50,639

back and explore again

164
00:06:55,749 --> 00:06:52,960
again my shout out to the team to me

165
00:06:58,469 --> 00:06:55,759
what will stick with me about cassini is

166
00:07:01,189 --> 00:06:58,479
the team in that room working together

167
00:07:02,950 --> 00:07:01,199
as one till the very end of this

168
00:07:06,210 --> 00:07:02,960
magnificent mission

169
00:07:15,110 --> 00:07:06,220
congrats to the cassini and to its team

170
00:07:17,909 --> 00:07:15,120
[Applause]

171
00:07:20,790 --> 00:07:17,919
okay thank you dr zurbukin so now i will

172
00:07:23,270 --> 00:07:20,800
introduce our panelists for today

173
00:07:32,390 --> 00:07:23,280
first right next to me is earl mays the

174
00:07:40,870 --> 00:07:34,710
next we have linda spilker the cassini

175
00:07:45,029 --> 00:07:43,110
and next to her we have julie webster

176
00:07:51,749 --> 00:07:45,039
the cassini spacecraft operations

177
00:07:57,029 --> 00:07:54,710
so now i'll turn it over to earl

178
00:08:01,749 --> 00:07:57,039
thanks joey maybe we could just reprise

179
00:08:06,230 --> 00:08:04,390
are you crying ps1 we just had

180
00:08:11,589 --> 00:08:06,240
transition to high rate mode

181
00:08:15,909 --> 00:08:13,350
we have lots of signals that's actually

182
00:08:17,990 --> 00:08:15,919
about your events

183
00:08:19,110 --> 00:08:18,000
project manager flight director

184
00:08:23,990 --> 00:08:19,120
go ahead

185
00:08:29,909 --> 00:08:26,950
project manager on fso court

186
00:08:31,430 --> 00:08:29,919
maybe a trickle of telemetry left but

187
00:08:34,230 --> 00:08:31,440
just heard the

188
00:08:36,550 --> 00:08:34,240

signal from the spacecraft is gone and

189
00:08:39,029 --> 00:08:36,560
within the next 45 seconds so will be

190
00:08:40,709 --> 00:08:39,039
the spacecraft

191
00:08:41,589 --> 00:08:40,719
i hope you're all

192
00:08:44,070 --> 00:08:41,599
as

193
00:08:46,389 --> 00:08:44,080
deeply proud of this amazing

194
00:08:48,870 --> 00:08:46,399
accomplishment congratulations to you

195
00:08:51,670 --> 00:08:48,880
all this has been an incredible mission

196
00:08:54,710 --> 00:08:51,680
an incredible spacecraft and you're all

197
00:08:56,949 --> 00:08:54,720
an incredible team i'm going to call

198
00:09:00,640 --> 00:08:56,959
this the end of mission

199
00:09:10,550 --> 00:09:00,650
project manager off the net

200
00:09:13,030 --> 00:09:10,560
[Applause]

201
00:09:17,030 --> 00:09:13,040
there there are times in this world when

202
00:09:18,949 --> 00:09:17,040
things just line up when everything is

203
00:09:21,030 --> 00:09:18,959
just about perfect

204
00:09:23,110 --> 00:09:21,040
a child's laugh

205
00:09:25,750 --> 00:09:23,120
a desert sunset

206
00:09:28,310 --> 00:09:25,760
and this morning it just couldn't have

207
00:09:30,630 --> 00:09:28,320
been better and if you think about that

208
00:09:32,870 --> 00:09:30,640
moment where we've been waiting for for

209
00:09:34,230 --> 00:09:32,880
this entire seven years

210
00:09:35,990 --> 00:09:34,240
everything clicked out just right and

211
00:09:38,230 --> 00:09:36,000
then we can step back and say the same

212
00:09:40,949 --> 00:09:38,240
thing about the cassini mission

213
00:09:43,110 --> 00:09:40,959

a superb machine in an amazing place

214
00:09:45,430 --> 00:09:43,120
doing everything we could possibly do to

215
00:09:47,509 --> 00:09:45,440
reveal the mysteries and secrets of our

216
00:09:50,310 --> 00:09:47,519
solar system

217
00:09:52,790 --> 00:09:50,320
this morning a lone explorer a machine

218
00:09:55,910 --> 00:09:52,800
made by humankind finished its mission

219
00:09:58,470 --> 00:09:55,920
900 million miles away

220
00:10:01,190 --> 00:09:58,480
the nearest observer wouldn't even know

221
00:10:02,550 --> 00:10:01,200
until 84 minutes later that cassini was

222
00:10:05,030 --> 00:10:02,560
gone

223
00:10:06,949 --> 00:10:05,040
to the very end the spacecraft did

224
00:10:09,030 --> 00:10:06,959
everything we asked

225
00:10:12,550 --> 00:10:09,040
that ground systems report was superb

226
00:10:13,750 --> 00:10:12,560
and we believe we got every last second

227
00:10:16,389 --> 00:10:13,760
of data

228
00:10:18,069 --> 00:10:16,399
it's already back in arizona and i think

229
00:10:20,230 --> 00:10:18,079
the analysts are already working on it

230
00:10:21,829 --> 00:10:20,240
so we have indeed accomplished exactly

231
00:10:23,350 --> 00:10:21,839
what we set out to do

232
00:10:24,630 --> 00:10:23,360
complete this mission with a saturn

233
00:10:26,630 --> 00:10:24,640
probe

234
00:10:28,870 --> 00:10:26,640
to the area

235
00:10:31,509 --> 00:10:28,880
maybe just a little bit about the legacy

236
00:10:33,990 --> 00:10:31,519
of the of this mission

237
00:10:36,389 --> 00:10:34,000
we've built the blocks and both

238
00:10:38,790 --> 00:10:36,399

scientifically and engineering-wise for

239
00:10:41,110 --> 00:10:38,800
the next set of missions europa will

240
00:10:43,269 --> 00:10:41,120
capitalize upon our engineering

241
00:10:44,949 --> 00:10:43,279
expertise and techniques and the

242
00:10:48,630 --> 00:10:44,959
instruments that we have developed for

243
00:10:50,470 --> 00:10:48,640
cassini 30 years later almost will be

244
00:10:52,550 --> 00:10:50,480
that much better and more sophisticated

245
00:10:53,750 --> 00:10:52,560
and tuned for the environment that we're

246
00:10:59,509 --> 00:10:53,760
in

247
00:11:01,269 --> 00:10:59,519
for future missions the fact that

248
00:11:02,389 --> 00:11:01,279
cassini presented a unique set of

249
00:11:03,190 --> 00:11:02,399
challenges

250
00:11:05,030 --> 00:11:03,200
to

251
00:11:06,949 --> 00:11:05,040
the the uh

252
00:11:08,310 --> 00:11:06,959
science and engineers of course there's

253
00:11:10,069 --> 00:11:08,320
that ever

254
00:11:12,550 --> 00:11:10,079
ever

255
00:11:15,430 --> 00:11:12,560
lasting tension between science goals

256
00:11:16,310 --> 00:11:15,440
and engineering conservatism

257
00:11:19,190 --> 00:11:16,320
but

258
00:11:20,870 --> 00:11:19,200
also this put the scientists in in

259
00:11:24,069 --> 00:11:20,880
contention with each other

260
00:11:24,870 --> 00:11:24,079
and with the engineers and the mix of

261
00:11:27,509 --> 00:11:24,880
this

262
00:11:29,829 --> 00:11:27,519
as a as an experiment in sociology uh

263
00:11:31,110 --> 00:11:29,839

was an astonishing success and i believe

264
00:11:32,630 --> 00:11:31,120
that the

265
00:11:34,470 --> 00:11:32,640
future missions are also going to learn

266
00:11:36,870 --> 00:11:34,480
how to cooperate and how to get the very

267
00:11:38,630 --> 00:11:36,880
best of their systems well with casino

268
00:11:39,910 --> 00:11:38,640
leaving the example

269
00:11:41,990 --> 00:11:39,920
we've been able to repurpose the

270
00:11:44,389 --> 00:11:42,000
spacecraft in all sorts of unique ways

271
00:11:46,389 --> 00:11:44,399
and as you just saw a little while ago

272
00:11:51,350 --> 00:11:46,399
we turned it into an atmospheric probe

273
00:11:56,389 --> 00:11:54,069
it's a benefit of of exploration i've

274
00:12:00,630 --> 00:11:56,399
got to thank the many thousands of

275
00:12:03,350 --> 00:12:00,640
people we had three space agencies

276
00:12:05,430 --> 00:12:03,360
17 member nations contributing to the

277
00:12:06,389 --> 00:12:05,440
launch and of the the hardware the

278
00:12:08,949 --> 00:12:06,399
mission

279
00:12:11,110 --> 00:12:08,959
hundreds of contractors thousands of

280
00:12:13,030 --> 00:12:11,120
individuals in science and engineering

281
00:12:15,030 --> 00:12:13,040
and we have to reach back all the way

282
00:12:17,910 --> 00:12:15,040
back to the early eighties for the folks

283
00:12:20,470 --> 00:12:17,920
that did those thankless cost exercises

284
00:12:22,829 --> 00:12:20,480
over and over again all the way up to

285
00:12:25,910 --> 00:12:22,839
now the people that sent the very final

286
00:12:29,590 --> 00:12:25,920
commands thank you and uh the gratitude

287
00:12:31,350 --> 00:12:29,600
i believe of of the of the of the world

288
00:12:33,590 --> 00:12:31,360

is is should be bestowed upon you for

289
00:12:34,550 --> 00:12:33,600
the accomplishments of this mission

290
00:12:36,470 --> 00:12:34,560
um

291
00:12:39,350 --> 00:12:36,480
we also need to thank our many millions

292
00:12:40,870 --> 00:12:39,360
of fans the the the heartwarming buzz

293
00:12:44,230 --> 00:12:40,880
that we've gotten from

294
00:12:46,629 --> 00:12:44,240
social media from educational uh

295
00:12:48,870 --> 00:12:46,639
uh regions throughout the world uh the

296
00:12:50,870 --> 00:12:48,880
media the more traditional media as well

297
00:12:51,829 --> 00:12:50,880
has just been great telling the cassini

298
00:12:54,949 --> 00:12:51,839
story

299
00:12:55,750 --> 00:12:54,959
inspiring the next set of explorers

300
00:12:57,910 --> 00:12:55,760
and

301
00:13:00,069 --> 00:12:57,920
is just absolutely as important to us as

302
00:13:04,310 --> 00:13:00,079
the scientific results we've found so

303
00:13:09,030 --> 00:13:06,629
the senior mission ended this morning

304
00:13:11,269 --> 00:13:09,040
high over the clouds of saturn the

305
00:13:12,550 --> 00:13:11,279
spacecraft is gone

306
00:13:15,269 --> 00:13:12,560
thanks

307
00:13:17,910 --> 00:13:15,279
and farewell faithful explorer

308
00:13:19,030 --> 00:13:17,920
but the legacy of cassini has has just

309
00:13:21,509 --> 00:13:19,040
begun

310
00:13:23,110 --> 00:13:21,519
the effect that cassini has and will

311
00:13:25,990 --> 00:13:23,120
have on the future of planetary

312
00:13:29,630 --> 00:13:26,000
exploration will go on for decades thank

313
00:13:41,670 --> 00:13:29,640

you and long live cassini

314
00:13:43,750 --> 00:13:41,680
[Applause]

315
00:13:46,870 --> 00:13:43,760
all right next up uh we have julie

316
00:13:51,910 --> 00:13:50,310
okay thank you um

317
00:14:04,069 --> 00:13:51,920
i

318
00:14:05,750 --> 00:14:04,079
yesterday

319
00:14:08,389 --> 00:14:05,760
i'm one of the people one of the

320
00:14:10,790 --> 00:14:08,399
privileged few that actually sat inside

321
00:14:11,910 --> 00:14:10,800
this spacecraft before it was put

322
00:14:12,949 --> 00:14:11,920
together

323
00:14:15,350 --> 00:14:12,959
and

324
00:14:16,790 --> 00:14:15,360
my my last image

325
00:14:19,030 --> 00:14:16,800
was

326
00:14:20,069 --> 00:14:19,040
inside of the of the parts and the

327
00:14:23,189 --> 00:14:20,079
wiring

328
00:14:25,430 --> 00:14:23,199
as as we went in um

329
00:14:28,629 --> 00:14:25,440
but we had

330
00:14:31,189 --> 00:14:28,639
we've had 13 years at saturn but uh 20

331
00:14:32,550 --> 00:14:31,199
years of of an incredible spacecraft

332
00:14:33,910 --> 00:14:32,560
that was

333
00:14:35,269 --> 00:14:33,920
designed

334
00:14:36,870 --> 00:14:35,279
by people

335
00:14:38,870 --> 00:14:36,880
and i can't emphasize this enough that

336
00:14:40,790 --> 00:14:38,880
had 30 years of experience when they

337
00:14:42,069 --> 00:14:40,800
designed it they had they took all the

338
00:14:43,990 --> 00:14:42,079

lessons learned

339
00:14:45,509 --> 00:14:44,000
from the voyagers and the galileos and

340
00:14:54,150 --> 00:14:45,519
the magellans

341
00:15:00,470 --> 00:14:57,269
and built a perfect spacecraft

342
00:15:01,670 --> 00:15:00,480
um you know right right to the last inn

343
00:15:04,230 --> 00:15:01,680
i i

344
00:15:07,030 --> 00:15:04,240
we the the whole electronic system of

345
00:15:09,590 --> 00:15:07,040
the spacecraft ran at room temperature

346
00:15:11,509 --> 00:15:09,600
that's an amazing accomplishment and

347
00:15:14,150 --> 00:15:11,519
that speaks to all the individual

348
00:15:17,670 --> 00:15:15,350
that

349
00:15:19,030 --> 00:15:17,680
built the spacecraft to last

350
00:15:36,150 --> 00:15:19,040
the

351
00:15:38,230 --> 00:15:36,160
different trajectories chosen at this

352
00:15:39,829 --> 00:15:38,240
point and um

353
00:15:43,189 --> 00:15:39,839
i think the goal was to make all

354
00:15:43,990 --> 00:15:43,199
scientists equally unhappy that's right

355
00:15:50,710 --> 00:15:44,000
and

356
00:15:53,189 --> 00:15:50,720
i i think you saw this morning that we

357
00:15:55,990 --> 00:15:53,199
did we we got

358
00:16:00,470 --> 00:15:57,990
almost 30 seconds longer than we

359
00:16:02,629 --> 00:16:00,480
predicted it didn't seem like it to me

360
00:16:05,110 --> 00:16:02,639
because it was in the flash of an eye

361
00:16:07,110 --> 00:16:05,120
the all night long the minute seemed

362
00:16:10,710 --> 00:16:07,120
like a long time and then all of a

363
00:16:15,269 --> 00:16:13,269

casino cassini as a spacecraft could

364
00:16:18,150 --> 00:16:15,279
have gone on a long time but it it

365
00:16:20,470 --> 00:16:18,160
accomplished its mission at saturn

366
00:16:22,550 --> 00:16:20,480
we we did everything that the scientists

367
00:16:24,790 --> 00:16:22,560
asked us to do and

368
00:16:27,509 --> 00:16:24,800
and we're really over

369
00:16:28,790 --> 00:16:27,519
during that time we traveled 4.9 billion

370
00:16:29,590 --> 00:16:28,800
miles

371
00:16:30,350 --> 00:16:29,600
we

372
00:16:34,629 --> 00:16:30,360
did

373
00:16:37,670 --> 00:16:34,639
292 and a half 293 orbits all unique

374
00:16:39,670 --> 00:16:37,680
orbits around saturn shaped by the

375
00:16:43,030 --> 00:16:39,680
navigation team and by the spacecraft

376
00:16:45,509 --> 00:16:43,040
team by the nav saying point here and go

377
00:16:48,310 --> 00:16:45,519
change your your speed this way

378
00:16:51,710 --> 00:16:48,320
and um the spacecraft performing it

379
00:16:54,670 --> 00:16:51,720
flawlessly we did

380
00:16:59,509 --> 00:16:54,680
360 burns we planned

381
00:17:01,110 --> 00:16:59,519
472 maneuvers we played we executed 360.

382
00:17:02,470 --> 00:17:01,120
a little more than half of those on the

383
00:17:04,390 --> 00:17:02,480
main engine

384
00:17:05,590 --> 00:17:04,400
uh the other half on the on the other

385
00:17:08,870 --> 00:17:05,600
part

386
00:17:13,669 --> 00:17:11,110
you know the the last 22

387
00:17:14,949 --> 00:17:13,679
the last 21 weeks since april

388
00:17:16,710 --> 00:17:14,959

um

389
00:17:18,870 --> 00:17:16,720
i was a i was a lot more nervous in

390
00:17:21,350 --> 00:17:18,880
april when we when we went when we dove

391
00:17:23,029 --> 00:17:21,360
through the first time i could barely

392
00:17:24,789 --> 00:17:23,039
speak i could barely breathe when we

393
00:17:25,510 --> 00:17:24,799
when we were waiting for that signal to

394
00:17:27,029 --> 00:17:25,520
say

395
00:17:30,789 --> 00:17:27,039
that we got through

396
00:17:33,830 --> 00:17:32,870
and this last time i i have no words

397
00:17:35,750 --> 00:17:33,840
because

398
00:17:37,029 --> 00:17:35,760
it it did exactly what it said it was

399
00:17:37,830 --> 00:17:37,039
supposed to do

400
00:17:40,630 --> 00:17:37,840
um

401
00:17:43,590 --> 00:17:40,640
even better even better even better as

402
00:17:46,390 --> 00:17:43,600
as it as it always did as it always did

403
00:17:47,430 --> 00:17:46,400
i i can't at radio science you know made

404
00:17:49,430 --> 00:17:47,440
the call

405
00:17:50,390 --> 00:17:49,440
for the for the end of mission

406
00:17:54,870 --> 00:17:50,400
and

407
00:17:56,950 --> 00:17:54,880
i can't tell you guys radio science does

408
00:17:58,470 --> 00:17:56,960
they do these 30-hour

409
00:18:00,390 --> 00:17:58,480
long

410
00:18:02,789 --> 00:18:00,400
days and i see them stay

411
00:18:04,710 --> 00:18:02,799
in day after day after day

412
00:18:07,190 --> 00:18:04,720
dr zerbrooken

413
00:18:08,230 --> 00:18:07,200

referred to the fact that cassini will

414
00:18:09,669 --> 00:18:08,240
will have

415
00:18:11,190 --> 00:18:09,679
questions for the scientists that will

416
00:18:12,390 --> 00:18:11,200
keep them up at night

417
00:18:14,470 --> 00:18:12,400
well

418
00:18:17,110 --> 00:18:14,480
i no longer have a spacecraft that will

419
00:18:18,710 --> 00:18:17,120
keep me up at night

420
00:18:20,789 --> 00:18:18,720
and i think

421
00:18:23,909 --> 00:18:20,799
after a few days i think i'm going to

422
00:18:27,190 --> 00:18:25,430
and and

423
00:18:28,710 --> 00:18:27,200
don't ask me tomorrow if i'm ready to

424
00:18:31,830 --> 00:18:28,720
build another one but

425
00:18:33,909 --> 00:18:31,840
you can ask me next month

426
00:18:35,830 --> 00:18:33,919
earl earl thinks he has a hold on me for

427
00:18:37,590 --> 00:18:35,840
a year to write the engineering report

428
00:18:40,549 --> 00:18:37,600
and and we've got

429
00:18:43,350 --> 00:18:40,559
20 years of test labs and flight

430
00:18:46,470 --> 00:18:43,360
hardware and support hardware

431
00:18:47,830 --> 00:18:46,480
and a team of 150 people

432
00:18:50,470 --> 00:18:47,840
to

433
00:18:52,310 --> 00:18:50,480
disperse and break down but

434
00:18:53,750 --> 00:18:52,320
right to the end it did it did

435
00:18:55,669 --> 00:18:53,760
everything

436
00:18:57,270 --> 00:18:55,679
and i you know a lot of the team is in

437
00:18:59,029 --> 00:18:57,280
here right now and i want to thank again

438
00:19:01,750 --> 00:18:59,039

the navigation spacecraft team the

439
00:19:03,990 --> 00:19:01,760
real-time operations that also work the

440
00:19:06,070 --> 00:19:04,000
thankless hours that were the ones that

441
00:19:07,590 --> 00:19:06,080
called me in the middle of the night

442
00:19:10,710 --> 00:19:07,600
um

443
00:19:12,950 --> 00:19:10,720
it's just it went perfect it did

444
00:19:15,350 --> 00:19:12,960
everything it asked us to do even when

445
00:19:17,110 --> 00:19:15,360
it didn't do it it was because what we

446
00:19:18,870 --> 00:19:17,120
told it to do

447
00:19:21,430 --> 00:19:18,880
it was our fault it was our fault it

448
00:19:23,430 --> 00:19:21,440
still was our fault

449
00:19:27,430 --> 00:19:23,440
it's perfect

450
00:19:29,830 --> 00:19:27,440
and it's um

451
00:19:32,470 --> 00:19:29,840
i played the moody blues

452
00:19:34,789 --> 00:19:32,480
my wildest dreams coming in and out of

453
00:19:36,470 --> 00:19:34,799
the lab the last few days so i blasted

454
00:19:38,710 --> 00:19:36,480
in the car going home and i blasted

455
00:19:40,310 --> 00:19:38,720
coming back in

456
00:19:45,669 --> 00:19:40,320
this

457
00:19:45,679 --> 00:19:56,230
thank you julie

458
00:20:00,950 --> 00:19:58,870
okay and now over to linda spielker

459
00:20:04,630 --> 00:20:00,960
well for me this has been an incredible

460
00:20:05,510 --> 00:20:04,640
journey with cassini that spanned 30

461
00:20:07,430 --> 00:20:05,520
years

462
00:20:10,789 --> 00:20:07,440
i was with the mission from when it was

463
00:20:13,110 --> 00:20:10,799

just an idea after the voyager flybys

464
00:20:15,350 --> 00:20:13,120
and now to see it through to the end is

465
00:20:16,549 --> 00:20:15,360
truly amazing and to share that with my

466
00:20:21,110 --> 00:20:16,559
family

467
00:20:22,470 --> 00:20:21,120
what a wonderful experience

468
00:20:24,870 --> 00:20:22,480
when i look back over the cassini

469
00:20:28,549 --> 00:20:24,880
mission i i see a mission that was

470
00:20:30,070 --> 00:20:28,559
running a 13-year marathon of scientific

471
00:20:32,950 --> 00:20:30,080
discovery

472
00:20:36,470 --> 00:20:32,960
and this last orbit was just the last

473
00:20:39,110 --> 00:20:36,480
lap and so we stood in celebration of

474
00:20:41,190 --> 00:20:39,120
successfully completing the race

475
00:20:43,590 --> 00:20:41,200
and i know i stood there with a mixture

476
00:20:45,669 --> 00:20:43,600
of applause and tears

477
00:20:47,909 --> 00:20:45,679
because it felt so much like losing a

478
00:20:49,350 --> 00:20:47,919
friend some a spacecraft i'd gotten to

479
00:20:51,350 --> 00:20:49,360
know so well

480
00:20:53,909 --> 00:20:51,360
and yet in looking ahead you know both

481
00:20:57,270 --> 00:20:53,919
an end and a beginning there's so much

482
00:20:59,270 --> 00:20:57,280
left so much incredible science left

483
00:21:00,070 --> 00:20:59,280
to figure out and understand decades

484
00:21:03,270 --> 00:21:00,080
worth

485
00:21:05,190 --> 00:21:03,280
science that will span a generation

486
00:21:07,510 --> 00:21:05,200
when i think about cassini going in i

487
00:21:09,029 --> 00:21:07,520
know that there's a piece of me there

488
00:21:11,990 --> 00:21:09,039

in heart and soul

489
00:21:14,710 --> 00:21:12,000
because i know we signed our signatures

490
00:21:18,549 --> 00:21:14,720
on a list of sheets those sheets were

491
00:21:21,510 --> 00:21:18,559
scanned in and put on a cd and that cd

492
00:21:22,310 --> 00:21:21,520
is on board cassini so a little piece of

493
00:21:25,190 --> 00:21:22,320
me

494
00:21:28,070 --> 00:21:25,200
went into saturn's atmosphere along with

495
00:21:29,830 --> 00:21:28,080
cassini so what an incredible ride

496
00:21:31,830 --> 00:21:29,840
and just lasting for so long i want to

497
00:21:34,390 --> 00:21:31,840
step back just a little bit if we could

498
00:21:37,029 --> 00:21:34,400
go to the first slide please

499
00:21:38,870 --> 00:21:37,039
this is an image put together by our

500
00:21:42,310 --> 00:21:38,880
visual infrared mapping spectrometer

501
00:21:44,950 --> 00:21:42,320
team they did a spectacular job turning

502
00:21:48,070 --> 00:21:44,960
around this data set that just came down

503
00:21:50,149 --> 00:21:48,080
last night and this is a view in the far

504
00:21:52,710 --> 00:21:50,159
in the infrared at five microns you can

505
00:21:55,909 --> 00:21:52,720
see the heat energy coming out of saturn

506
00:21:57,510 --> 00:21:55,919
and this is the place where cassini took

507
00:22:00,789 --> 00:21:57,520
its final plunge and if we go to the

508
00:22:03,830 --> 00:22:00,799
next graphic see little area lips there

509
00:22:05,590 --> 00:22:03,840
that's where we think cassini went in to

510
00:22:07,590 --> 00:22:05,600
the atmosphere of saturn

511
00:22:09,350 --> 00:22:07,600
so you know what an incredible ride and

512
00:22:11,750 --> 00:22:09,360
to get that that was the very last set

513
00:22:13,909 --> 00:22:11,760

of vim's images that came back from

514
00:22:16,789 --> 00:22:13,919
cassini and so so here it is turned

515
00:22:19,110 --> 00:22:16,799
around very quickly for you to see

516
00:22:21,190 --> 00:22:19,120
if we go on to the next set we had our

517
00:22:22,870 --> 00:22:21,200
last downlink of images

518
00:22:26,149 --> 00:22:22,880
and i'll just look at this and you can

519
00:22:28,789 --> 00:22:26,159
share uh what we saw for our final set

520
00:22:31,750 --> 00:22:28,799
of images and data

521
00:22:35,110 --> 00:22:31,760
saturn enceladus setting behind saturn

522
00:22:39,590 --> 00:22:37,270
part of the mosaic of saturn and the

523
00:22:41,750 --> 00:22:39,600
rings in color our last look at this

524
00:22:42,789 --> 00:22:41,760
incredible system

525
00:22:44,950 --> 00:22:42,799
titan

526
00:22:47,909 --> 00:22:44,960
you can see the lakes and seas at the

527
00:22:51,669 --> 00:22:47,919
north pole and the haze at the limb

528
00:22:54,310 --> 00:22:51,679
and even better view of the lakes

529
00:22:56,149 --> 00:22:54,320
there's daftness creating its wake along

530
00:22:58,950 --> 00:22:56,159
the edge of the keeler gap and the

531
00:23:01,430 --> 00:22:58,960
beautiful structure in the rings

532
00:23:03,270 --> 00:23:01,440
[Music]

533
00:23:06,070 --> 00:23:03,280
another view looking out across the

534
00:23:07,830 --> 00:23:06,080
rings the bright b ring the dark cassini

535
00:23:09,190 --> 00:23:07,840
division snuggled next to it

536
00:23:10,870 --> 00:23:09,200
[Music]

537
00:23:12,549 --> 00:23:10,880
views that we're going to miss for a

538
00:23:14,630 --> 00:23:12,559

long time to come

539
00:23:17,029 --> 00:23:14,640
that little tiny propeller a little

540
00:23:19,750 --> 00:23:17,039
object just above the dark gap

541
00:23:22,870 --> 00:23:19,760
a large set of ring particles together

542
00:23:29,270 --> 00:23:22,880
trying to force open a gap and here's

543
00:23:33,110 --> 00:23:31,350
so what an incredible incredible

544
00:23:34,710 --> 00:23:33,120
wonderful set of data

545
00:23:37,029 --> 00:23:34,720
as we went into the atmosphere we had

546
00:23:38,549 --> 00:23:37,039
eight of our science instruments on

547
00:23:40,549 --> 00:23:38,559
including the ion and neutral mass

548
00:23:42,870 --> 00:23:40,559
spectrometer we had the magnetometer we

549
00:23:45,430 --> 00:23:42,880
were collecting gravity data

550
00:23:46,390 --> 00:23:45,440
there to answer questions about saturn

551
00:23:48,950 --> 00:23:46,400
itself

552
00:23:51,510 --> 00:23:48,960
but in particular trying to understand

553
00:23:53,830 --> 00:23:51,520
as we probe deeper into the atmosphere

554
00:23:55,510 --> 00:23:53,840
the hydrogen to helium ratio

555
00:23:57,430 --> 00:23:55,520
you can't measure helium unless you're

556
00:24:00,070 --> 00:23:57,440
directly measuring you can infer it you

557
00:24:02,470 --> 00:24:00,080
can model it but to be there and

558
00:24:04,549 --> 00:24:02,480
directly measure and sample

559
00:24:06,630 --> 00:24:04,559
that was absolutely amazing and so that

560
00:24:08,630 --> 00:24:06,640
team is hard at work right now

561
00:24:11,110 --> 00:24:08,640
of looking at their data and trying to

562
00:24:12,549 --> 00:24:11,120
assess what they saw in those very final

563
00:24:14,549 --> 00:24:12,559

moments and i'm sure they'll be very

564
00:24:16,390 --> 00:24:14,559
happy that julie was able to get the

565
00:24:19,909 --> 00:24:16,400
spacecraft to survive

566
00:24:21,269 --> 00:24:19,919
those extra seconds as we plunged on in

567
00:24:23,190 --> 00:24:21,279
and then of course the longer term

568
00:24:24,070 --> 00:24:23,200
analysis as i said that will go on for

569
00:24:25,669 --> 00:24:24,080
years

570
00:24:27,590 --> 00:24:25,679
and i just want to thank everyone as

571
00:24:28,870 --> 00:24:27,600
well in particular the international

572
00:24:30,870 --> 00:24:28,880
science team

573
00:24:34,310 --> 00:24:30,880
a lot of them are down at caltech we had

574
00:24:36,230 --> 00:24:34,320
too many to try and fit all at jpl and

575
00:24:37,750 --> 00:24:36,240
so they're down and they've been

576
00:24:40,710 --> 00:24:37,760
celebrating and i've heard having a

577
00:24:43,190 --> 00:24:40,720
great time from the reports i've heard

578
00:24:46,390 --> 00:24:43,200
and also to thank the public as earl

579
00:24:48,470 --> 00:24:46,400
said who have come along with us

580
00:24:51,830 --> 00:24:48,480
and when i think about cassini i think

581
00:24:53,669 --> 00:24:51,840
cassini's final gift to humanity was the

582
00:24:55,590 --> 00:24:53,679
fact that we knew the day

583
00:24:57,750 --> 00:24:55,600
the hour the minute

584
00:24:59,909 --> 00:24:57,760
and now the second of the plunge and so

585
00:25:02,149 --> 00:24:59,919
we could gather together with the

586
00:25:04,630 --> 00:25:02,159
scientists the engineers

587
00:25:07,590 --> 00:25:04,640
with the public with our own families

588
00:25:09,190 --> 00:25:07,600

you can think of us as a giant worldwide

589
00:25:11,190 --> 00:25:09,200
cassini family

590
00:25:12,230 --> 00:25:11,200
and share this final moment of the

591
00:25:14,870 --> 00:25:12,240
plunge

592
00:25:16,630 --> 00:25:14,880
and have that memory to add to our

593
00:25:18,310 --> 00:25:16,640
cassini scrapbooks

594
00:25:20,710 --> 00:25:18,320
and if i had one thing i could say to

595
00:25:24,710 --> 00:25:20,720
cassini i'd say goodbye cassini

596
00:25:28,070 --> 00:25:24,720
thanks for the ringside seat at saturn

597
00:25:37,990 --> 00:25:28,080
and as thomas said we'll be back thank

598
00:25:42,390 --> 00:25:40,149
okay thank you linda so we're now going

599
00:25:43,750 --> 00:25:42,400
to go into the question and answer part

600
00:25:46,390 --> 00:25:43,760
of our briefing

601
00:25:48,390 --> 00:25:46,400
so a reminder for reporters on the phone

602
00:25:49,269 --> 00:25:48,400
press star 1 and you'll get put into the

603
00:25:52,149 --> 00:25:49,279
queue

604
00:25:55,110 --> 00:25:52,159
we'll have social media questions with

605
00:25:56,710 --> 00:25:55,120
ask nasa and anyone here in the room if

606
00:25:58,789 --> 00:25:56,720
you'll raise your hand we'll bring a mic

607
00:26:00,149 --> 00:25:58,799
around and you can stand up and ask a

608
00:26:01,269 --> 00:26:00,159
question so

609
00:26:02,310 --> 00:26:01,279
do we have any questions here in the

610
00:26:04,549 --> 00:26:02,320
room

611
00:26:07,590 --> 00:26:04,559
we have one right there

612
00:26:09,430 --> 00:26:07,600
uh hi thank you all and congratulations

613
00:26:10,950 --> 00:26:09,440

614
00:26:13,110 --> 00:26:10,960
i know it was a long shot but just

615
00:26:15,350 --> 00:26:13,120
wondering if any of those telescopes in

616
00:26:17,990 --> 00:26:15,360
the uh you know over by australia and in

617
00:26:20,710 --> 00:26:18,000
that area actually saw the flash of

618
00:26:23,110 --> 00:26:20,720
saturn of cassini going into saturn

619
00:26:24,710 --> 00:26:23,120
i haven't heard any reports back about

620
00:26:26,710 --> 00:26:24,720
that yet and

621
00:26:27,830 --> 00:26:26,720
it was a long shot and maybe we'll see

622
00:26:29,190 --> 00:26:27,840
something

623
00:26:30,390 --> 00:26:29,200
and i was wondering if you could also

624
00:26:32,470 --> 00:26:30,400
just mention um because you mentioned

625
00:26:33,430 --> 00:26:32,480
the science instruments going into the

626
00:26:35,029 --> 00:26:33,440
planet

627
00:26:36,870 --> 00:26:35,039
how much hope do you have that those

628
00:26:38,630 --> 00:26:36,880
measurements are going to help you

629
00:26:40,310 --> 00:26:38,640
finally figure out the rotation the

630
00:26:41,990 --> 00:26:40,320
internal rotation rate of saturn and the

631
00:26:45,269 --> 00:26:42,000
the length of the day

632
00:26:46,710 --> 00:26:45,279
well michelle is here and she's

633
00:26:48,950 --> 00:26:46,720
looking pretty grim but i know she's

634
00:26:54,390 --> 00:26:48,960
going to work really hard to figure that

635
00:26:57,350 --> 00:26:55,830
michelle there you go

636
00:26:59,350 --> 00:26:57,360
i mean you know one of the things that

637
00:27:01,029 --> 00:26:59,360
we were hoping is if we take data for as

638
00:27:02,630 --> 00:27:01,039

long as possible on the way in that will

639
00:27:04,549 --> 00:27:02,640
get us closer to the planet than

640
00:27:07,029 --> 00:27:04,559
anything's ever been and we need to do

641
00:27:09,029 --> 00:27:07,039
that to be able to try and resolve the

642
00:27:09,909 --> 00:27:09,039
tilt between the dipole and the rotation

643
00:27:11,909 --> 00:27:09,919
axis

644
00:27:13,830 --> 00:27:11,919
i'm hoping we can do it i'm not going to

645
00:27:18,070 --> 00:27:13,840
promise but ask me in three months time

646
00:27:22,549 --> 00:27:19,590
we have some other questions over here

647
00:27:26,630 --> 00:27:24,070
emily lochtawa from the planetary

648
00:27:28,870 --> 00:27:26,640
society um we were watching two graphs

649
00:27:30,390 --> 00:27:28,880
uh right down toward the end one of them

650
00:27:31,190 --> 00:27:30,400
flatlined a little earlier than the

651
00:27:32,950 --> 00:27:31,200
other

652
00:27:34,390 --> 00:27:32,960
and the bottom one seemed to kind of go

653
00:27:35,669 --> 00:27:34,400
up and down a little bit can you tell us

654
00:27:37,029 --> 00:27:35,679
what was happening what were the two

655
00:27:38,950 --> 00:27:37,039
different ones and what was happening

656
00:27:41,190 --> 00:27:38,960
there you were watching the radio

657
00:27:44,149 --> 00:27:41,200
science signal the carrier

658
00:27:46,549 --> 00:27:44,159
the actual x x-band carrier was the top

659
00:27:48,789 --> 00:27:46,559
one that that's the one that's the eight

660
00:27:50,390 --> 00:27:48,799
gigahertz signal that we have our uh

661
00:27:52,470 --> 00:27:50,400
telemetry on

662
00:27:54,870 --> 00:27:52,480
and the other one was a radio science

663
00:27:57,190 --> 00:27:54,880

signal that was coherent with that at

664
00:28:00,389 --> 00:27:57,200
two two gigahertz down

665
00:28:02,789 --> 00:28:00,399
uh lower than it so we expected

666
00:28:05,029 --> 00:28:02,799
that the s band would last longer than

667
00:28:07,909 --> 00:28:05,039
the x the x is when we cut off the

668
00:28:10,149 --> 00:28:07,919
telemetry but because the x has a wider

669
00:28:13,510 --> 00:28:10,159
beam width pattern that it would last

670
00:28:15,830 --> 00:28:13,520
and you may i i don't know if if a seal

671
00:28:18,870 --> 00:28:15,840
or elias can answer that you may have

672
00:28:21,269 --> 00:28:18,880
seen a couple of side bands coming down

673
00:28:23,269 --> 00:28:21,279
for the for the sbn they have they have

674
00:28:26,070 --> 00:28:23,279
pretty dramatic and you might have seen

675
00:28:28,710 --> 00:28:26,080
a little on the x but it it it goes way

676
00:28:31,269 --> 00:28:28,720
way down into a first null uh in less

677
00:28:33,590 --> 00:28:31,279
than a degree and then it might have

678
00:28:36,789 --> 00:28:33,600
bounced up after that but

679
00:28:38,710 --> 00:28:36,799
it was a sideband of s-ban

680
00:28:40,549 --> 00:28:38,720
okay sorry

681
00:28:42,710 --> 00:28:40,559
sarah hi uh sarah kaplan from the

682
00:28:44,950 --> 00:28:42,720
washington post um linda you showed us

683
00:28:46,630 --> 00:28:44,960
that image of the infrared image of the

684
00:28:48,870 --> 00:28:46,640
spot where cassini

685
00:28:50,310 --> 00:28:48,880
probably disintegrated can you tell us

686
00:28:53,990 --> 00:28:50,320
anything about that spot and sort of

687
00:28:57,269 --> 00:28:55,269
yeah i haven't looked in any detail

688
00:28:58,870 --> 00:28:57,279

maybe bob brown who's back here do you

689
00:29:03,350 --> 00:28:58,880
know anything about that region of the

690
00:29:06,070 --> 00:29:04,470
thanks mom

691
00:29:09,430 --> 00:29:06,080
i guess i would call it a j random

692
00:29:11,750 --> 00:29:09,440
saturn atmosphere around 10 degrees

693
00:29:13,110 --> 00:29:11,760
of latitude

694
00:29:16,870 --> 00:29:13,120
we

695
00:29:20,389 --> 00:29:16,880
image that site

696
00:29:21,990 --> 00:29:20,399
a few months back and because the impact

697
00:29:23,830 --> 00:29:22,000
took place on the dark side and because

698
00:29:26,389 --> 00:29:23,840
we can see in the dark

699
00:29:28,630 --> 00:29:26,399
what you see there is the thermal

700
00:29:30,950 --> 00:29:28,640
heat image from saturn it's the heat

701
00:29:34,870 --> 00:29:30,960
leaking out of saturn's interior we took

702
00:29:38,470 --> 00:29:37,430
sorry when was that image taken

703
00:29:41,350 --> 00:29:38,480
about

704
00:29:43,430 --> 00:29:41,360
15 hours ago thank you

705
00:29:44,870 --> 00:29:43,440
okay great any other questions in the

706
00:29:47,590 --> 00:29:44,880
room

707
00:29:49,909 --> 00:29:47,600
okay we're going to go to the phones

708
00:29:52,070 --> 00:29:49,919
we have marcia dunn of the ap on the

709
00:29:54,710 --> 00:29:52,080
line please go ahead

710
00:29:55,590 --> 00:29:54,720
yes hello thank you i'm just wondering

711
00:29:57,750 --> 00:29:55,600
um

712
00:30:00,870 --> 00:29:57,760
if the toasts have begun yet is there

713
00:30:02,630 --> 00:30:00,880

champagne in store for the team um

714
00:30:05,909 --> 00:30:02,640
it's morning or afternoon

715
00:30:07,430 --> 00:30:05,919
what what's next for celebrations

716
00:30:10,630 --> 00:30:07,440
well the science team is going to get

717
00:30:11,669 --> 00:30:10,640
together uh later this afternoon uh and

718
00:30:13,669 --> 00:30:11,679
we're going to get together and

719
00:30:16,950 --> 00:30:13,679
celebrate and reminisce about the good

720
00:30:21,430 --> 00:30:18,870
the flight team is going to get some

721
00:30:25,269 --> 00:30:23,190
and we're going to get together on on

722
00:30:26,789 --> 00:30:25,279
sunday afternoon but i don't think we're

723
00:30:30,149 --> 00:30:26,799
going to wait until then to open the

724
00:30:33,669 --> 00:30:32,230
okay well let's go to some social media

725
00:30:36,630 --> 00:30:33,679
questions

726
00:30:38,870 --> 00:30:36,640
kendra so nancy asks as cassini's

727
00:30:40,630 --> 00:30:38,880
journey ends what questions you do you

728
00:30:44,149 --> 00:30:40,640
have left that you would like to see

729
00:30:45,990 --> 00:30:44,159
explored in future missions to saturn

730
00:30:48,549 --> 00:30:46,000
for future missions to saturn i think

731
00:30:49,990 --> 00:30:48,559
there are a lot of possibilities one

732
00:30:51,669 --> 00:30:50,000
certainly involves the tiny moon

733
00:30:53,110 --> 00:30:51,679
enceladus

734
00:30:55,350 --> 00:30:53,120
and the potential for life in that

735
00:30:57,269 --> 00:30:55,360
global ocean is there life in that ocean

736
00:30:59,909 --> 00:30:57,279
to go back with the instruments to

737
00:31:02,149 --> 00:30:59,919
sample through the plume titan

738
00:31:04,870 --> 00:31:02,159

you know the potential for astrobiology

739
00:31:06,870 --> 00:31:04,880
in the oceans on titan to have something

740
00:31:08,630 --> 00:31:06,880
perhaps to land and figure that out also

741
00:31:10,389 --> 00:31:08,640
the source of methane and titan's

742
00:31:13,990 --> 00:31:10,399
atmosphere that keeps the atmosphere as

743
00:31:15,990 --> 00:31:14,000
extensive as it is the hexagon what's

744
00:31:18,389 --> 00:31:16,000
keeping it going and going and going

745
00:31:20,710 --> 00:31:18,399
like the energizer bunny it just

746
00:31:23,190 --> 00:31:20,720
keeps going also there's questions about

747
00:31:25,430 --> 00:31:23,200
the rings can we get even closer and

748
00:31:28,070 --> 00:31:25,440
look at those individual ring particles

749
00:31:29,830 --> 00:31:28,080
to try and understand what's going on

750
00:31:30,870 --> 00:31:29,840
so lots of questions remain and that's

751
00:31:33,110 --> 00:31:30,880
why i say

752
00:31:34,950 --> 00:31:33,120
we have to go back

753
00:31:35,830 --> 00:31:34,960
let's take another social media question

754
00:31:37,669 --> 00:31:35,840
sure

755
00:31:40,549 --> 00:31:37,679
parth is asking which is a great

756
00:31:42,310 --> 00:31:40,559
follow-up what's the next probe

757
00:31:44,149 --> 00:31:42,320
what is the next probe or spacecraft

758
00:31:47,350 --> 00:31:44,159
that will be sent to saturn

759
00:31:50,070 --> 00:31:47,360
who will have to ask nasa and about that

760
00:31:51,430 --> 00:31:50,080
june green about that

761
00:31:53,350 --> 00:31:51,440
oh sorry go

762
00:31:54,549 --> 00:31:53,360
well can we get a mic to jim green oh

763
00:31:56,470 --> 00:31:54,559

there we go

764
00:31:59,110 --> 00:31:56,480
so i'm jim green i'm the director of

765
00:32:01,110 --> 00:31:59,120
planetary science at nasa and currently

766
00:32:02,950 --> 00:32:01,120
we're conducting a competition we call

767
00:32:05,669 --> 00:32:02,960
new frontiers

768
00:32:09,590 --> 00:32:05,679
and in that call for proposals we

769
00:32:11,509 --> 00:32:09,600
included enceladus and titan

770
00:32:13,990 --> 00:32:11,519
so hang tight going through the

771
00:32:16,470 --> 00:32:14,000
evaluations now and by the end of the

772
00:32:18,230 --> 00:32:16,480
year we'll start announcing uh what are

773
00:32:20,149 --> 00:32:18,240
some of the finalists that we'll look in

774
00:32:21,909 --> 00:32:20,159
greater detail at

775
00:32:23,509 --> 00:32:21,919
there's also a saturn pro mission i

776
00:32:25,269 --> 00:32:23,519
think in that there's a saturn probe

777
00:32:28,710 --> 00:32:25,279
nest thank you very much linda there is

778
00:32:30,870 --> 00:32:28,720
indeed the saturn already for decades in

779
00:32:32,549 --> 00:32:30,880
terms of being able to get into the

780
00:32:35,350 --> 00:32:32,559
get into the clouds and really

781
00:32:37,350 --> 00:32:35,360
understand its composition and and uh

782
00:32:39,509 --> 00:32:37,360
much more about it uh saturn probe was

783
00:32:41,350 --> 00:32:39,519
also on that list thank you right and

784
00:32:43,350 --> 00:32:41,360
casino is really sort of a micro probe

785
00:32:45,190 --> 00:32:43,360
just looking at the very top level and

786
00:32:47,830 --> 00:32:45,200
so this probe would go much deeper like

787
00:32:49,590 --> 00:32:47,840
the galileo pro

788
00:32:51,269 --> 00:32:49,600

okay great just a reminder again if

789
00:32:52,870 --> 00:32:51,279
you're on the phone star one for

790
00:32:54,070 --> 00:32:52,880
reporter questions and if you're in here

791
00:32:55,669 --> 00:32:54,080
raise your hand

792
00:32:58,290 --> 00:32:55,679
we have a we have a follow-up question

793
00:33:01,750 --> 00:32:59,669
[Music]

794
00:33:03,350 --> 00:33:01,760
so emily lochtawa with follow-up um what

795
00:33:05,190 --> 00:33:03,360
does it mean that you had this signal

796
00:33:07,430 --> 00:33:05,200
for 30 seconds longer is that just the

797
00:33:09,509 --> 00:33:07,440
usual over performance of the dsn and

798
00:33:11,029 --> 00:33:09,519
locking on the spacecraft or does it

799
00:33:13,190 --> 00:33:11,039
mean that the spacecraft was able to

800
00:33:14,789 --> 00:33:13,200
fight the atmosphere for longer

801
00:33:16,950 --> 00:33:14,799
i think it's a little bit of of

802
00:33:18,630 --> 00:33:16,960
everything the spacecraft i think we did

803
00:33:21,190 --> 00:33:18,640
come in a little bit later than we

804
00:33:22,470 --> 00:33:21,200
thought um and

805
00:33:24,630 --> 00:33:22,480
that just

806
00:33:26,630 --> 00:33:24,640
didn't delay the the demise it just

807
00:33:29,029 --> 00:33:26,640
delayed the start of it but we always

808
00:33:30,230 --> 00:33:29,039
thought the dsn has just been phenomenal

809
00:33:32,070 --> 00:33:30,240
they've been tuned in as well as you

810
00:33:34,549 --> 00:33:32,080
could and the spacecraft

811
00:33:36,710 --> 00:33:34,559
you know the all of our modeling is is

812
00:33:39,350 --> 00:33:36,720
we don't have any real world experience

813
00:33:42,070 --> 00:33:39,360

with this and so to be within 13 seconds

814
00:33:45,110 --> 00:33:42,080
of our predict is for us that's a that's

815
00:33:48,630 --> 00:33:46,950
okay let's uh oh we have another

816
00:33:50,870 --> 00:33:48,640
reporter question here oh she's coming

817
00:33:52,549 --> 00:33:50,880
right behind you

818
00:33:55,590 --> 00:33:52,559
thank you uh lisa grossman from science

819
00:33:57,830 --> 00:33:55,600
news can you just confirm what the the

820
00:33:59,190 --> 00:33:57,840
actual times were for the

821
00:34:00,710 --> 00:33:59,200
um

822
00:34:02,389 --> 00:34:00,720
atmosphere insertion and then loss of

823
00:34:06,389 --> 00:34:02,399
signal because are they different from

824
00:34:10,710 --> 00:34:06,399
what was projected yeah it was uh 11 55

825
00:34:12,349 --> 00:34:10,720
39 for the x-band signal which also cost

826
00:34:15,909 --> 00:34:12,359
the telemetry and

827
00:34:18,550 --> 00:34:15,919
1155-46 for s

828
00:34:20,869 --> 00:34:18,560
loss of signal and we had predicted much

829
00:34:23,349 --> 00:34:20,879
to my embarrassment uh yesterday's press

830
00:34:24,790 --> 00:34:23,359
conference i uh called it that's that's

831
00:34:27,349 --> 00:34:24,800
that's utc

832
00:34:28,669 --> 00:34:27,359
also okay so well it's

833
00:34:30,230 --> 00:34:28,679
we called

834
00:34:32,470 --> 00:34:30,240
455.16

835
00:34:34,470 --> 00:34:32,480
i unfortunately announced 06. but the

836
00:34:36,710 --> 00:34:34,480
real the baseline we were working from

837
00:34:40,550 --> 00:34:36,720
was 5516

838
00:34:42,389 --> 00:34:40,560

and we lost x-band at 55.39 and that

839
00:34:44,950 --> 00:34:42,399
essentially is when we lost

840
00:34:46,710 --> 00:34:44,960
data spacecraft of course was going to

841
00:34:48,950 --> 00:34:46,720
last longer on for at least another

842
00:34:51,750 --> 00:34:48,960
minute but then and of course the s ban

843
00:34:52,629 --> 00:34:51,760
did go a little bit longer

844
00:34:54,149 --> 00:34:52,639
okay

845
00:34:55,349 --> 00:34:54,159
let's take another question from social

846
00:34:56,310 --> 00:34:55,359
media

847
00:34:58,870 --> 00:34:56,320
sure

848
00:35:01,030 --> 00:34:58,880
this question is from orion

849
00:35:02,470 --> 00:35:01,040
did cassini have only options to rush

850
00:35:03,910 --> 00:35:02,480
into saturn i would like to know if

851
00:35:05,670 --> 00:35:03,920
there are other ideas that have been

852
00:35:08,310 --> 00:35:05,680
considered

853
00:35:10,310 --> 00:35:08,320
we had lots of different ideas

854
00:35:11,829 --> 00:35:10,320
and what really came down to it let me

855
00:35:12,950 --> 00:35:11,839
just give you a few of the different

856
00:35:14,710 --> 00:35:12,960
flavors

857
00:35:17,510 --> 00:35:14,720
we could have left the saturn system

858
00:35:19,349 --> 00:35:17,520
altogether and gone to jupiter

859
00:35:20,870 --> 00:35:19,359
or out to euros

860
00:35:23,190 --> 00:35:20,880
those were very long

861
00:35:24,790 --> 00:35:23,200
missions and we would not be chatting

862
00:35:26,790 --> 00:35:24,800
about them and probably our children

863
00:35:28,790 --> 00:35:26,800

would not be chatting about them uh

864
00:35:30,470 --> 00:35:28,800
they're very long and there were several

865
00:35:32,310 --> 00:35:30,480
options so those were discarded pretty

866
00:35:34,310 --> 00:35:32,320
much immediately but as an exercise

867
00:35:36,390 --> 00:35:34,320
could we leave the system there's also

868
00:35:37,910 --> 00:35:36,400
centaur asteroid mission that was was

869
00:35:39,750 --> 00:35:37,920
actually achievable

870
00:35:41,589 --> 00:35:39,760
um

871
00:35:44,550 --> 00:35:41,599
staying at saturn

872
00:35:46,630 --> 00:35:44,560
we could have gone into first of all

873
00:35:47,990 --> 00:35:46,640
if we stay at saturn the cassini

874
00:35:49,750 --> 00:35:48,000
spacecraft

875
00:35:51,910 --> 00:35:49,760
must be

876
00:35:54,150 --> 00:35:51,920
put into a safe place there are

877
00:35:56,630 --> 00:35:54,160
international treaties that require us

878
00:35:58,390 --> 00:35:56,640
not to leave an untended spacecraft in

879
00:36:00,230 --> 00:35:58,400
the inner system where it might

880
00:36:02,950 --> 00:36:00,240
inadvertently collide with

881
00:36:05,190 --> 00:36:02,960
enceladus which we know is just rife

882
00:36:07,589 --> 00:36:05,200
with all of the materials for life titan

883
00:36:09,670 --> 00:36:07,599
or any of the other icy satellites so if

884
00:36:11,589 --> 00:36:09,680
we stayed inside the saturn system we

885
00:36:13,430 --> 00:36:11,599
had to dispose of the spacecraft somehow

886
00:36:15,109 --> 00:36:13,440
well then it becomes where's the best

887
00:36:17,270 --> 00:36:15,119
science well it's inside the saturn

888
00:36:20,390 --> 00:36:17,280

system it's not way out at the edges

889
00:36:22,710 --> 00:36:20,400
it's inside so seven years ago we began

890
00:36:25,270 --> 00:36:22,720
a mission that

891
00:36:26,790 --> 00:36:25,280
planned to use every last kilogram of

892
00:36:29,349 --> 00:36:26,800
our propellant

893
00:36:31,349 --> 00:36:29,359
and finish up exactly the way we did

894
00:36:33,109 --> 00:36:31,359
we knew that these final 22 orbits were

895
00:36:34,550 --> 00:36:33,119
very risky so we didn't want to put them

896
00:36:36,470 --> 00:36:34,560
in the middle because then we would

897
00:36:37,750 --> 00:36:36,480
maybe not come back out so it turns out

898
00:36:39,510 --> 00:36:37,760
they weren't anywhere near as risky as

899
00:36:42,470 --> 00:36:39,520
we thought so we could have done a lot

900
00:36:44,550 --> 00:36:42,480
more but you know that's all hindsight

901
00:36:45,750 --> 00:36:44,560
so there were lots of other options but

902
00:36:46,950 --> 00:36:45,760
this was

903
00:36:49,109 --> 00:36:46,960
by far

904
00:36:51,349 --> 00:36:49,119
the best cassini going out with the

905
00:36:53,750 --> 00:36:51,359
empty tank of gas at the very top of its

906
00:36:57,349 --> 00:36:53,760
game and is scientifically unexplored

907
00:37:00,630 --> 00:36:58,710
great okay we have another reported

908
00:37:02,710 --> 00:37:00,640
question in the room

909
00:37:05,030 --> 00:37:02,720
hi there steve futterman from cbs news i

910
00:37:06,950 --> 00:37:05,040
want to ask the three of you

911
00:37:08,630 --> 00:37:06,960
a question that's not really concerns

912
00:37:11,109 --> 00:37:08,640
the data or what you've discovered but

913
00:37:13,589 --> 00:37:11,119

just sort of the the human side of this

914
00:37:15,670 --> 00:37:13,599
mission this spacecraft we all know the

915
00:37:18,310 --> 00:37:15,680
story of pinocchio the wooden dial that

916
00:37:20,150 --> 00:37:18,320
becomes human i'm wondering

917
00:37:23,109 --> 00:37:20,160
what was going through your heart and

918
00:37:24,950 --> 00:37:23,119
soul today as this came to an end i'm

919
00:37:27,750 --> 00:37:24,960
not suggesting it became like a child to

920
00:37:31,589 --> 00:37:27,760
you but what did cassini mean to you

921
00:37:36,950 --> 00:37:34,390
yes yes it does her i mean what can you

922
00:37:39,670 --> 00:37:36,960
say we've been with the spacecraft off

923
00:37:40,950 --> 00:37:39,680
and on since since uh since launch i

924
00:37:43,670 --> 00:37:40,960
haven't been on the mission the entire

925
00:37:46,390 --> 00:37:43,680
time but i i helped build it i helped

926
00:37:49,270 --> 00:37:46,400
launch it i've been through up 20 years

927
00:37:51,910 --> 00:37:49,280
with it it is an extension of ourselves

928
00:37:54,150 --> 00:37:51,920
an extension in in kind of the the more

929
00:37:57,430 --> 00:37:54,160
anthropomorphic sense but also in our

930
00:37:58,790 --> 00:37:57,440
senses itself we are out at saturn

931
00:38:01,510 --> 00:37:58,800
every day

932
00:38:04,069 --> 00:38:01,520
we get a call back home we get data we

933
00:38:06,550 --> 00:38:04,079
get images we know what's going on out

934
00:38:08,870 --> 00:38:06,560
there and that is an extension i believe

935
00:38:11,589 --> 00:38:08,880
of all of us we believe of ourselves and

936
00:38:13,990 --> 00:38:11,599
so that's gone there's a there's a loss

937
00:38:16,390 --> 00:38:14,000
if it if i can talk about it being a

938
00:38:18,390 --> 00:38:16,400

robot that's it's uh it finished the end

939
00:38:20,630 --> 00:38:18,400
of its serviceable life that needs to be

940
00:38:21,990 --> 00:38:20,640
put into the junk pile but you know now

941
00:38:23,589 --> 00:38:22,000
of course

942
00:38:24,950 --> 00:38:23,599
there's element of truth to that there's

943
00:38:27,829 --> 00:38:24,960
also an element of truth that has been

944
00:38:29,750 --> 00:38:27,839
our companion and and our dutiful

945
00:38:32,069 --> 00:38:29,760
servant for many many dec several

946
00:38:34,470 --> 00:38:32,079
decades and so there yeah it is a loss

947
00:38:37,030 --> 00:38:34,480
but there's also a sense of serenity and

948
00:38:39,109 --> 00:38:37,040
peace with that because we've done

949
00:38:41,190 --> 00:38:39,119
exactly what we believe is the correct

950
00:38:45,109 --> 00:38:41,200
thing and so there's

951
00:38:46,790 --> 00:38:45,119
it's a whole potpourri you name it

952
00:38:48,870 --> 00:38:46,800
yeah i think for me there's a core of

953
00:38:51,349 --> 00:38:48,880
sadness and and part in thinking about

954
00:38:53,750 --> 00:38:51,359
the breakup of the cassini family coming

955
00:38:55,430 --> 00:38:53,760
into work on monday morning and

956
00:38:57,270 --> 00:38:55,440
knowing that there'll be empty offices

957
00:38:59,430 --> 00:38:57,280
there and the people i could just stop

958
00:39:01,750 --> 00:38:59,440
by to chat with we'll be off often doing

959
00:39:03,510 --> 00:39:01,760
other things and but it's both an end

960
00:39:05,750 --> 00:39:03,520
and a beginning as these people go off

961
00:39:07,910 --> 00:39:05,760
and work on other things but i also feel

962
00:39:09,510 --> 00:39:07,920
a tremendous sense of pride to have

963
00:39:11,829 --> 00:39:09,520

worked on this mission

964
00:39:12,950 --> 00:39:11,839
over so many decades and to see the

965
00:39:15,349 --> 00:39:12,960
fruition

966
00:39:16,950 --> 00:39:15,359
of this particular mission

967
00:39:17,990 --> 00:39:16,960
although part of the sadness is thinking

968
00:39:19,910 --> 00:39:18,000
about

969
00:39:21,510 --> 00:39:19,920
you know cassini has revealed

970
00:39:24,550 --> 00:39:21,520
saturn as familiar as our own

971
00:39:26,630 --> 00:39:24,560
neighborhood might be and now for a time

972
00:39:28,950 --> 00:39:26,640
until we go back

973
00:39:31,270 --> 00:39:28,960
that's a distant very distant world now

974
00:39:33,750 --> 00:39:31,280
just like a small little world in a

975
00:39:36,150 --> 00:39:33,760
telescope and those details of the rings

976
00:39:39,910 --> 00:39:36,160
those tiny moons snuggled in so close

977
00:39:42,950 --> 00:39:39,920
those are all gone until we go back

978
00:39:45,109 --> 00:39:42,960
i think it's the loss of the of the the

979
00:39:47,750 --> 00:39:45,119
day-to-day you know we're

980
00:39:49,589 --> 00:39:47,760
we're in the trenches working this all

981
00:39:52,950 --> 00:39:49,599
the time you know with a with a core

982
00:39:55,829 --> 00:39:52,960
team of people that you see every day

983
00:39:58,950 --> 00:39:55,839
for eight hours plus and

984
00:40:00,870 --> 00:39:58,960
sometimes a lot longer than that and and

985
00:40:03,270 --> 00:40:00,880
i don't know if did earl say that we

986
00:40:05,589 --> 00:40:03,280
stepped on you know that the celestial

987
00:40:08,150 --> 00:40:05,599
mechanics does not recognize u.s

988
00:40:10,790 --> 00:40:08,160

holidays or european holidays

989
00:40:13,270 --> 00:40:10,800
we stomped on every christmas every

990
00:40:15,270 --> 00:40:13,280
thanksgiving we were always either doing

991
00:40:16,870 --> 00:40:15,280
a maneuver or something went wrong with

992
00:40:20,150 --> 00:40:16,880
the spacecraft

993
00:40:22,390 --> 00:40:20,160
and so for our families um

994
00:40:24,790 --> 00:40:22,400
maybe they will be glad not to have the

995
00:40:26,630 --> 00:40:24,800
pager go off in the middle of the night

996
00:40:28,470 --> 00:40:26,640
or in the middle of dinner going oh

997
00:40:31,190 --> 00:40:28,480
sorry i got to run i got to go take care

998
00:40:34,870 --> 00:40:32,790
and it's it's the loss of that

999
00:40:36,230 --> 00:40:34,880
camaraderie i think

1000
00:40:37,829 --> 00:40:36,240
for me

1001
00:40:39,829 --> 00:40:37,839
and i really thought i was going to be

1002
00:40:41,670 --> 00:40:39,839
more sad about the spacecraft but you

1003
00:40:44,790 --> 00:40:41,680
can't i i'm not

1004
00:40:49,030 --> 00:40:44,800
the spacecraft did everything we ask it

1005
00:40:50,950 --> 00:40:49,040
to do everything right to the very end

1006
00:40:52,630 --> 00:40:50,960
that's that's all you can do for anybody

1007
00:40:54,950 --> 00:40:52,640
that's all you that's all you want for

1008
00:40:56,870 --> 00:40:54,960
any human let alone

1009
00:40:58,309 --> 00:40:56,880
you know a

1010
00:41:00,950 --> 00:40:58,319
a robot

1011
00:41:07,829 --> 00:41:00,960
did any of you have tears today

1012
00:41:12,710 --> 00:41:10,309
i think we messed it up a little bit i i

1013
00:41:15,030 --> 00:41:12,720

must admit it's uh it was it was a very

1014
00:41:17,430 --> 00:41:15,040
emotional moment yeah i think tears and

1015
00:41:19,750 --> 00:41:17,440
applause at the same time and i had a

1016
00:41:21,510 --> 00:41:19,760
little purple hanky there you know to be

1017
00:41:25,349 --> 00:41:21,520
able to use so

1018
00:41:30,630 --> 00:41:27,109
okay we're going to go back to the

1019
00:41:33,030 --> 00:41:30,640
phones we have leo enright of irish tv

1020
00:41:34,950 --> 00:41:33,040
go ahead

1021
00:41:38,150 --> 00:41:34,960
uh thank you very much i wonder could i

1022
00:41:40,230 --> 00:41:38,160
ask a question of alvaro jimenez of uh

1023
00:41:43,270 --> 00:41:40,240
yes yes once you come up to the podium

1024
00:41:48,470 --> 00:41:46,550
thank you very much um

1025
00:41:50,990 --> 00:41:48,480
what i wanted to know really was i mean

1026
00:41:54,150 --> 00:41:51,000
when we look at hubble we look at

1027
00:41:56,870 --> 00:41:54,160
cassini-huygens uh we look at soho all

1028
00:42:00,069 --> 00:41:56,880
these great collaborative missions

1029
00:42:03,670 --> 00:42:00,079
uh between the united states and europe

1030
00:42:04,710 --> 00:42:03,680
i wonder what is the prospect of us ever

1031
00:42:07,309 --> 00:42:04,720
frankly

1032
00:42:09,910 --> 00:42:07,319
uh doing these sort of great

1033
00:42:12,470 --> 00:42:09,920
collaborations again is it going to

1034
00:42:14,470 --> 00:42:12,480
happen or is it more likely

1035
00:42:18,150 --> 00:42:14,480
that europe and the us will take

1036
00:42:20,470 --> 00:42:18,160
slightly more independent paths

1037
00:42:23,910 --> 00:42:20,480
well we have we are very proud of

1038
00:42:26,550 --> 00:42:23,920

actually having collaborated with nasa

1039
00:42:27,510 --> 00:42:26,560
in in this great mission

1040
00:42:31,829 --> 00:42:27,520
and

1041
00:42:34,390 --> 00:42:31,839
mind we are convinced this is the way to

1042
00:42:37,270 --> 00:42:34,400
go we have to work together to really be

1043
00:42:40,069 --> 00:42:37,280
ambitious and achieve missions like this

1044
00:42:43,030 --> 00:42:40,079
one this could be in different fields we

1045
00:42:45,670 --> 00:42:43,040
have now as you have mentioned

1046
00:42:47,670 --> 00:42:45,680
jwst to be launched this is a another

1047
00:42:50,230 --> 00:42:47,680
great mission where europe is deeply

1048
00:42:52,950 --> 00:42:50,240
involved with nasa

1049
00:42:54,630 --> 00:42:52,960
we have the experience of hubble we have

1050
00:42:56,150 --> 00:42:54,640
missions though and that has been a

1051
00:43:00,390 --> 00:42:56,160
little bit of a change

1052
00:43:03,109 --> 00:43:00,400
where also are led by issa but nasa is

1053
00:43:04,470 --> 00:43:03,119
participating also actively like jews to

1054
00:43:06,790 --> 00:43:04,480
jupiter

1055
00:43:09,589 --> 00:43:06,800
and we are looking into all kinds of

1056
00:43:11,270 --> 00:43:09,599
possibilities now we would like to have

1057
00:43:14,550 --> 00:43:11,280
more and more

1058
00:43:17,349 --> 00:43:14,560
cooperation and i think here we have an

1059
00:43:18,710 --> 00:43:17,359
example to follow which is cassini

1060
00:43:21,670 --> 00:43:18,720
huygens

1061
00:43:24,630 --> 00:43:21,680
where it is important to have the same

1062
00:43:27,190 --> 00:43:24,640
goals but also define well

1063
00:43:28,630 --> 00:43:27,200

clean interfaces clean management

1064
00:43:32,309 --> 00:43:28,640
structure

1065
00:43:35,430 --> 00:43:32,319
how the mission is led how is uh put in

1066
00:43:38,710 --> 00:43:35,440
place and then making it a success so

1067
00:43:40,710 --> 00:43:38,720
i'm really making sure because

1068
00:43:43,349 --> 00:43:40,720
we have and this is something you can

1069
00:43:45,829 --> 00:43:43,359
see in europe and in the us

1070
00:43:48,150 --> 00:43:45,839
our scientists the scientific community

1071
00:43:51,190 --> 00:43:48,160
is totally

1072
00:43:54,470 --> 00:43:51,200
mixed they are working together already

1073
00:43:57,030 --> 00:43:54,480
regardless of what the agencies do

1074
00:43:59,349 --> 00:43:57,040
and if they work together we are

1075
00:44:06,829 --> 00:43:59,359
servicing our scientific community we

1076
00:44:11,750 --> 00:44:08,950
together okay

1077
00:44:13,510 --> 00:44:11,760
all right thank you um

1078
00:44:14,870 --> 00:44:13,520
okay so why don't we go back to social

1079
00:44:17,510 --> 00:44:14,880
media

1080
00:44:19,990 --> 00:44:17,520
sure president buff asked what was the

1081
00:44:22,530 --> 00:44:20,000
most surprising reveal and have any of

1082
00:44:26,150 --> 00:44:22,540
you named a child or pet after cassini

1083
00:44:28,550 --> 00:44:26,160
[Laughter]

1084
00:44:32,950 --> 00:44:31,109
no child or pet named after casino we

1085
00:44:35,030 --> 00:44:32,960
have named some of the features in the

1086
00:44:37,109 --> 00:44:35,040
rings

1087
00:44:40,230 --> 00:44:37,119
that's true larry raises a very good

1088
00:44:41,829 --> 00:44:40,240

point larry's with the ultraviolet team

1089
00:44:46,870 --> 00:44:41,839
and they the some of the features have

1090
00:44:49,829 --> 00:44:48,309
i do remember hearing one of the

1091
00:44:53,270 --> 00:44:49,839
engineers telling me that he named his

1092
00:44:55,190 --> 00:44:53,280
daughter phoebe after the moon phoebe so

1093
00:44:56,390 --> 00:44:55,200
okay let's uh take another social media

1094
00:44:58,630 --> 00:44:56,400
question

1095
00:45:00,230 --> 00:44:58,640
jason is asking what do you feel is the

1096
00:45:01,990 --> 00:45:00,240
most valuable contribution of the

1097
00:45:05,109 --> 00:45:02,000
cassini mission to science and space

1098
00:45:09,670 --> 00:45:06,870
well there are probably two answers i'll

1099
00:45:12,309 --> 00:45:09,680
defer the science question to linda but

1100
00:45:13,349 --> 00:45:12,319
i think in terms of showing a path

1101
00:45:15,750 --> 00:45:13,359
forward

1102
00:45:18,550 --> 00:45:15,760
in space exploration the techniques that

1103
00:45:20,309 --> 00:45:18,560
cassini has has developed in

1104
00:45:23,109 --> 00:45:20,319
astrodynamics celestial mechanics

1105
00:45:26,230 --> 00:45:23,119
mission design and engineering and and

1106
00:45:29,510 --> 00:45:26,240
as i mentioned in my earlier remarks

1107
00:45:30,630 --> 00:45:29,520
in just being able to to

1108
00:45:32,710 --> 00:45:30,640
manage

1109
00:45:35,910 --> 00:45:32,720
an extremely complex system to the

1110
00:45:39,190 --> 00:45:35,920
ultimate of its capabilities and i might

1111
00:45:41,750 --> 00:45:39,200
also add the importance of a flagship

1112
00:45:44,390 --> 00:45:41,760
a mission that has

1113
00:45:46,470 --> 00:45:44,400

a full suite of instruments ready to

1114
00:45:48,390 --> 00:45:46,480
deal with whatever it finds

1115
00:45:50,069 --> 00:45:48,400
there's always room for the tactical

1116
00:45:51,670 --> 00:45:50,079
missions with a focused instrument but

1117
00:45:54,870 --> 00:45:51,680
something that's ready to deal with

1118
00:45:56,870 --> 00:45:54,880
whatever it finds and then go back again

1119
00:45:58,790 --> 00:45:56,880
and we have stories over and over again

1120
00:46:01,270 --> 00:45:58,800
where one instrument has revealed

1121
00:46:03,190 --> 00:46:01,280
something about saturn or its moons and

1122
00:46:06,309 --> 00:46:03,200
the other instruments have all piled on

1123
00:46:08,870 --> 00:46:06,319
and we get from a little snippet also a

1124
00:46:11,030 --> 00:46:08,880
full picture of the entire thing so the

1125
00:46:13,750 --> 00:46:11,040
value of flagship the engineering

1126
00:46:16,790 --> 00:46:13,760
techniques and and uh management

1127
00:46:18,390 --> 00:46:16,800
techniques that have been exploited uh i

1128
00:46:21,190 --> 00:46:18,400
think are

1129
00:46:22,630 --> 00:46:21,200
lead us the way we'll lead the way okay

1130
00:46:25,190 --> 00:46:22,640
i would certainly agree with earl to

1131
00:46:28,470 --> 00:46:25,200
have that full toolbox of instruments

1132
00:46:29,750 --> 00:46:28,480
available to follow up on the unexpected

1133
00:46:31,589 --> 00:46:29,760
discoveries

1134
00:46:33,190 --> 00:46:31,599
and as far as cassini goes i think one

1135
00:46:34,870 --> 00:46:33,200
of the biggest legacies from cassini

1136
00:46:36,950 --> 00:46:34,880
will be the fact that we now know that

1137
00:46:39,349 --> 00:46:36,960
there are ocean worlds not only around

1138
00:46:42,309 --> 00:46:39,359

jupiter but also around saturn you have

1139
00:46:44,309 --> 00:46:42,319
enceladus titan perhaps diony sort of

1140
00:46:46,550 --> 00:46:44,319
opening up our view of where could we

1141
00:46:48,309 --> 00:46:46,560
find life in our solar system and maybe

1142
00:46:50,550 --> 00:46:48,319
it doesn't have to be in that narrow

1143
00:46:52,390 --> 00:46:50,560
zone the goldilocks zone where the earth

1144
00:46:54,790 --> 00:46:52,400
is but could be elsewhere and the

1145
00:46:57,430 --> 00:46:54,800
implications forward for exoplanets as

1146
00:46:59,670 --> 00:46:57,440
well

1147
00:47:02,470 --> 00:46:59,680
okay we have a couple of other questions

1148
00:47:05,829 --> 00:47:02,480
uh the gentleman in the back there hold

1149
00:47:09,670 --> 00:47:07,030
thank you

1150
00:47:11,589 --> 00:47:09,680
hi my name is neville

1151
00:47:13,990 --> 00:47:11,599
you had on board the cassini something

1152
00:47:17,430 --> 00:47:14,000
that could quote unquote sniff the

1153
00:47:19,589 --> 00:47:17,440
atmosphere was it a hope or an absolute

1154
00:47:20,950 --> 00:47:19,599
plan that you would be able to utilize

1155
00:47:25,750 --> 00:47:20,960
that

1156
00:47:28,790 --> 00:47:25,760
neutral mass spectrometer we've used it

1157
00:47:30,630 --> 00:47:28,800
very successfully for titan's atmosphere

1158
00:47:33,589 --> 00:47:30,640
for looking in the gap the gas from the

1159
00:47:35,109 --> 00:47:33,599
plumes from enceladus and also earlier

1160
00:47:37,750 --> 00:47:35,119
orbits where he had sort of dipped our

1161
00:47:40,390 --> 00:47:37,760
toe into the atmosphere of saturn so we

1162
00:47:41,910 --> 00:47:40,400
knew it would work and continue to work

1163
00:47:44,470 --> 00:47:41,920

and we just wanted to keep getting data

1164
00:47:46,870 --> 00:47:44,480
back as long as we could to get those

1165
00:47:48,309 --> 00:47:46,880
very last seconds the deepest data that

1166
00:47:49,750 --> 00:47:48,319
we could get

1167
00:47:51,349 --> 00:47:49,760
let me just pilot that for a second

1168
00:47:53,349 --> 00:47:51,359
because when we launched

1169
00:47:55,829 --> 00:47:53,359
the ion industrial mass spectrometer was

1170
00:47:57,990 --> 00:47:55,839
going to be used for titan

1171
00:48:00,390 --> 00:47:58,000
right that's it we got enceladus and we

1172
00:48:03,109 --> 00:48:00,400
got them saturn again because of the

1173
00:48:04,950 --> 00:48:03,119
fact that we were able to

1174
00:48:06,710 --> 00:48:04,960
find these

1175
00:48:09,030 --> 00:48:06,720
uh mysteries with other instruments and

1176
00:48:11,349 --> 00:48:09,040
then use this mass spec

1177
00:48:12,309 --> 00:48:11,359
in in a different way so again it's just

1178
00:48:13,990 --> 00:48:12,319
the point

1179
00:48:15,349 --> 00:48:14,000
if you can fit it on

1180
00:48:17,589 --> 00:48:15,359
jim will probably shoot me for this but

1181
00:48:20,390 --> 00:48:17,599
if you get it on under price

1182
00:48:22,790 --> 00:48:20,400
buy or get the ride and that's kind of

1183
00:48:25,589 --> 00:48:22,800
the point of my question is you're

1184
00:48:27,990 --> 00:48:25,599
building into these missions

1185
00:48:29,670 --> 00:48:28,000
serendipity with the anticipation that

1186
00:48:31,589 --> 00:48:29,680
it could maybe

1187
00:48:34,309 --> 00:48:31,599
be used in another way absolutely you

1188
00:48:36,390 --> 00:48:34,319

have to even even a very tactical

1189
00:48:37,750 --> 00:48:36,400
mission with a single objective in a

1190
00:48:39,750 --> 00:48:37,760
single instrument

1191
00:48:42,549 --> 00:48:39,760
still has got to be ready for to roll

1192
00:48:44,309 --> 00:48:42,559
with the punches or the surprises uh

1193
00:48:46,390 --> 00:48:44,319
this is that cassini happened to be so

1194
00:48:48,470 --> 00:48:46,400
superbly built for that because if you

1195
00:48:50,309 --> 00:48:48,480
see something with one instrument then

1196
00:48:52,630 --> 00:48:50,319
the entire might and majesty the entire

1197
00:48:55,030 --> 00:48:52,640
spacecraft can be brought onto it and

1198
00:48:56,390 --> 00:48:55,040
reveal and enceladus if i don't have the

1199
00:48:59,030 --> 00:48:56,400
time to go in the story of how many

1200
00:49:01,589 --> 00:48:59,040
instruments it took to reveal that

1201
00:49:02,790 --> 00:49:01,599
entire story it's a the entire

1202
00:49:04,630 --> 00:49:02,800
spacecraft

1203
00:49:07,349 --> 00:49:04,640
i think it took every instrument on the

1204
00:49:10,710 --> 00:49:07,359
spacecraft working together to reveal

1205
00:49:12,790 --> 00:49:10,720
what we know today about enceladus so

1206
00:49:14,470 --> 00:49:12,800
every single one

1207
00:49:17,109 --> 00:49:14,480
thank you okay other questions in the

1208
00:49:20,950 --> 00:49:17,119
room are the gentlemen here in the front

1209
00:49:24,790 --> 00:49:23,349
hi i'm kurt j mack i'm here with the

1210
00:49:27,270 --> 00:49:24,800
nasa social

1211
00:49:29,990 --> 00:49:27,280
a lot of the pictures from cassini were

1212
00:49:32,950 --> 00:49:30,000
uploaded online in real time the raw

1213
00:49:35,190 --> 00:49:32,960

images and were taken by amateurs and

1214
00:49:38,069 --> 00:49:35,200
people online and stitched together and

1215
00:49:40,069 --> 00:49:38,079
uh almost finished before the scientists

1216
00:49:42,470 --> 00:49:40,079
got a chance to do so i wonder if that

1217
00:49:45,430 --> 00:49:42,480
was an expected outcome and if that

1218
00:49:46,870 --> 00:49:45,440
impacts the way and the decisions made

1219
00:49:49,109 --> 00:49:46,880
during the mission and perhaps future

1220
00:49:50,710 --> 00:49:49,119
missions for such uh images we love the

1221
00:49:53,190 --> 00:49:50,720
amateurs to get out there in fact i

1222
00:49:55,270 --> 00:49:53,200
think emily loctawa here was one of the

1223
00:49:58,069 --> 00:49:55,280
first to put together a movie of

1224
00:49:59,750 --> 00:49:58,079
enceladus uh setting behind saturn i

1225
00:50:01,829 --> 00:49:59,760
think i saw it last night so she got

1226
00:50:03,270 --> 00:50:01,839
those images and put them together right

1227
00:50:05,109 --> 00:50:03,280
away we love it that's what we want to

1228
00:50:06,950 --> 00:50:05,119
do is involve the community there's a

1229
00:50:09,670 --> 00:50:06,960
there's a small community that's been

1230
00:50:11,430 --> 00:50:09,680
doing this to us for years and so we we

1231
00:50:12,390 --> 00:50:11,440
don't even try to get ahead of him

1232
00:50:14,390 --> 00:50:12,400
anymore

1233
00:50:16,309 --> 00:50:14,400
we are scooped at the minute and that's

1234
00:50:18,950 --> 00:50:16,319
what cassini's always been about get the

1235
00:50:20,710 --> 00:50:18,960
images out it was a decision from nasa a

1236
00:50:22,630 --> 00:50:20,720
long time ago

1237
00:50:24,630 --> 00:50:22,640
as soon as they're on the ground

1238
00:50:26,230 --> 00:50:24,640

everybody gets to see them and then do

1239
00:50:28,150 --> 00:50:26,240
what you will and we've got some great

1240
00:50:30,549 --> 00:50:28,160
graphics they're better than ours

1241
00:50:32,150 --> 00:50:30,559
sometimes

1242
00:50:33,589 --> 00:50:32,160
i have to be careful about that they're

1243
00:50:36,150 --> 00:50:33,599
qui they're faster

1244
00:50:39,190 --> 00:50:36,160
they're faster than ours you know and so

1245
00:50:41,670 --> 00:50:39,200
it satisfies that need for the immediacy

1246
00:50:44,710 --> 00:50:41,680
so all right well we're reaching the end

1247
00:50:46,870 --> 00:50:44,720
of the hour here so um we're going to do

1248
00:50:48,470 --> 00:50:46,880
a playback of the graphics that you saw

1249
00:50:50,870 --> 00:50:48,480
in today's press briefing including

1250
00:50:53,109 --> 00:50:50,880
those last wonderful images that linda

1251
00:50:55,109 --> 00:50:53,119
showed earlier we're also going to add

1252
00:50:57,750 --> 00:50:55,119
some additional saturn imagery onto the

1253
00:51:02,490 --> 00:50:57,760
feed so thank you everyone for helping

1254
00:51:19,510 --> 00:51:02,500
us say goodbye to cassini and to saturn

1255
00:51:19,520 --> 00:51:42,630
thank you everyone

1256
00:51:42,640 --> 00:51:52,470
uh

1257
00:51:52,480 --> 00:53:31,690
thanks so much

1258
00:53:31,700 --> 00:54:42,549
[Music]

1259
00:54:46,630 --> 00:54:45,190
systems acs one we just had transition

1260
00:54:51,990 --> 00:54:46,640
to high rate mode

1261
00:54:56,309 --> 00:54:53,829
we have lots of signals that actually

1262
00:54:58,390 --> 00:54:56,319
benefit your events

1263
00:54:59,510 --> 00:54:58,400

project manager flight director

1264
00:55:04,390 --> 00:54:59,520
go ahead

1265
00:55:10,309 --> 00:55:07,349
project manager on fso cord

1266
00:55:11,829 --> 00:55:10,319
maybe a trickle of telemetry left but

1267
00:55:14,630 --> 00:55:11,839
just heard the

1268
00:55:16,950 --> 00:55:14,640
signal from the spacecraft is gone and

1269
00:55:19,430 --> 00:55:16,960
within the next 45 seconds so will be

1270
00:55:21,109 --> 00:55:19,440
the spacecraft

1271
00:55:21,990 --> 00:55:21,119
i hope you're all

1272
00:55:24,470 --> 00:55:22,000
as

1273
00:55:26,790 --> 00:55:24,480
deeply proud of this amazing

1274
00:55:29,270 --> 00:55:26,800
accomplishment congratulations to you

1275
00:55:32,069 --> 00:55:29,280
all this has been an incredible mission

1276
00:55:34,390 --> 00:55:32,079
an incredible spacecraft and you're all

1277
00:55:35,829 --> 00:55:34,400
an incredible team

1278
00:55:37,349 --> 00:55:35,839
i'm going to call this the end of

1279
00:55:41,120 --> 00:55:37,359
mission

1280
00:55:51,350 --> 00:55:41,130
project manager off the net