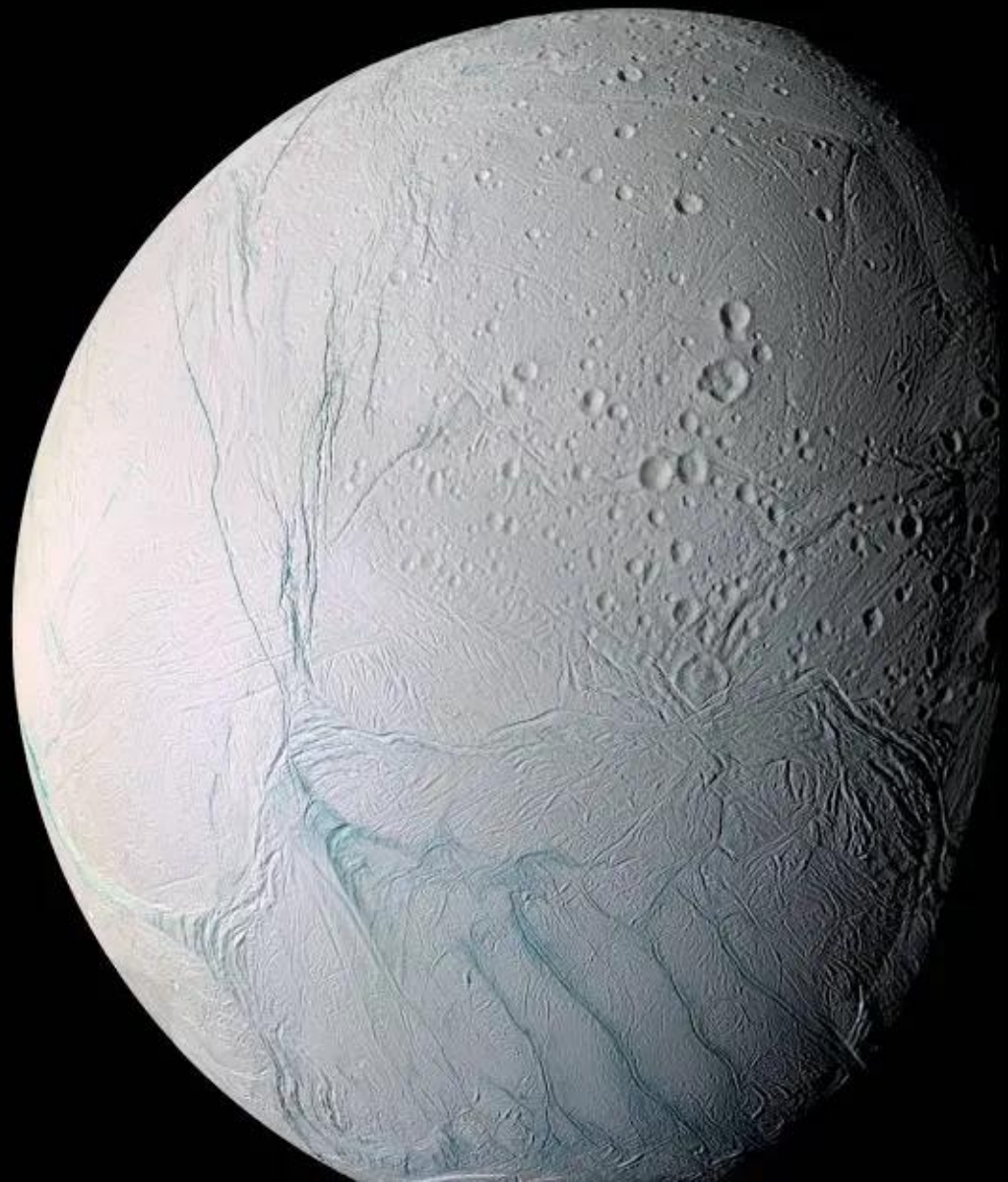

1
00:00:04,070 --> 00:00:02,710
welcome and thank you for standing by at

2
00:00:06,309 --> 00:00:04,080
this time all participants are in a

3
00:00:07,829 --> 00:00:06,319
listen only mode during the question and

4
00:00:10,390 --> 00:00:07,839
answer session of today's call you may

5
00:00:12,549 --> 00:00:10,400
press star one to ask a question

6
00:00:13,830 --> 00:00:12,559
today's conference is being recorded and

7
00:00:16,470 --> 00:00:13,840
at this time i turn the call to mr

8
00:00:18,630 --> 00:00:16,480
dwayne brown you may begin sir well

9
00:00:20,390 --> 00:00:18,640
thank you operator and good afternoon to

10
00:00:22,150 --> 00:00:20,400
everyone again my name is dwayne brown

11
00:00:24,710 --> 00:00:22,160
with nasa's office of communications

12
00:00:27,429 --> 00:00:24,720
here at nasa headquarters and got to

13
00:00:28,950 --> 00:00:27,439

tell you we've got a good one today

14
00:00:31,189 --> 00:00:28,960
a couple of days from now wednesday

15
00:00:32,750 --> 00:00:31,199
october 28th nasa's cassini spacecraft

16
00:00:35,750 --> 00:00:32,760
will sample an

17
00:00:37,270 --> 00:00:35,760
extraterrestrial ocean

18
00:00:39,110 --> 00:00:37,280
the spacecraft when it flies directly

19
00:00:41,510 --> 00:00:39,120
through a plume of icy spray coming from

20
00:00:44,310 --> 00:00:41,520
saturn's moon enceladus

21
00:00:46,470 --> 00:00:44,320
we'll have brief presentations from our

22
00:00:49,670 --> 00:00:46,480
cassini team

23
00:00:52,389 --> 00:00:49,680
they will be using graphics and

24
00:00:53,950 --> 00:00:52,399
just a reminder those graphics can

25
00:00:57,110 --> 00:00:53,960
be obtained at

26
00:01:00,950 --> 00:00:57,120
www.nasa.gov slash cassini slash telecom

27
00:01:08,149 --> 00:01:04,149
slash cassini c-a-s-s-i-n-i

28
00:01:09,270 --> 00:01:08,159
slash telecon t-e-l-e-c-o-n

29
00:01:11,510 --> 00:01:09,280
this

30
00:01:13,670 --> 00:01:11,520
teleconference will be replayed in its

31
00:01:18,070 --> 00:01:13,680
entirety for several days

32
00:01:19,590 --> 00:01:18,080
the replay number is 800 391 9851 again

33
00:01:21,230 --> 00:01:19,600
that's 800

34
00:01:23,749 --> 00:01:21,240
391

35
00:01:25,910 --> 00:01:23,759
9851 and of course

36
00:01:27,350 --> 00:01:25,920
social media is above about what's going

37
00:01:29,030 --> 00:01:27,360
to take place in a couple of days

38
00:01:31,190 --> 00:01:29,040

sending in those questions social media

39
00:01:32,870 --> 00:01:31,200
they're already coming in and we will be

40
00:01:35,910 --> 00:01:32,880
hearing some of those questions at

41
00:01:38,310 --> 00:01:35,920
hashtag ask nasa follow the conversation

42
00:01:39,670 --> 00:01:38,320
twitter facebook youtube a lot of

43
00:01:41,350 --> 00:01:39,680
excitement

44
00:01:43,590 --> 00:01:41,360
so

45
00:01:46,950 --> 00:01:43,600
extraterrestrial ocean wednesday october

46
00:01:49,270 --> 00:01:46,960
28th you're here from starting with

47
00:01:50,950 --> 00:01:49,280
kurt never

48
00:01:53,830 --> 00:01:50,960
cassini program scientist at nasa

49
00:01:54,950 --> 00:01:53,840
headquarters in washington

50
00:01:57,030 --> 00:01:54,960
mays

51
00:01:58,789 --> 00:01:57,040
cassini project manager at nasa's jet

52
00:02:00,870 --> 00:01:58,799
propulsion laboratory in pasadena

53
00:02:03,510 --> 00:02:00,880
california

54
00:02:05,990 --> 00:02:03,520
and linda spielker a cassini project

55
00:02:08,150 --> 00:02:06,000
scientist also at jpl so let's get

56
00:02:09,430 --> 00:02:08,160
started and i'll toss it to kurt

57
00:02:12,550 --> 00:02:09,440
thank you duane

58
00:02:14,150 --> 00:02:12,560
the cassini mission is incredible the

59
00:02:16,710 --> 00:02:14,160
mission has provided non-stop

60
00:02:17,670 --> 00:02:16,720
discoveries for 11 years now and

61
00:02:19,510 --> 00:02:17,680
counting

62
00:02:21,589 --> 00:02:19,520
cassini has demonstrated two things to

63
00:02:23,910 --> 00:02:21,599

us over that time span

64
00:02:25,589 --> 00:02:23,920
first that the universe will continue to

65
00:02:27,990 --> 00:02:25,599
surprise and amaze us

66
00:02:30,550 --> 00:02:28,000
and second that we as a people have the

67
00:02:32,949 --> 00:02:30,560
ingenuity and the passion to reveal and

68
00:02:36,790 --> 00:02:32,959
to revel in those surprises

69
00:02:39,830 --> 00:02:36,800
enceladus a tiny cold icy moon orbiting

70
00:02:42,390 --> 00:02:39,840
saturn very distant from the warm sun

71
00:02:44,390 --> 00:02:42,400
has been the source of some of the most

72
00:02:46,869 --> 00:02:44,400
amazing and unexpected of our

73
00:02:48,550 --> 00:02:46,879
discoveries in the saturn system

74
00:02:50,550 --> 00:02:48,560
early in the mission we discovered jets

75
00:02:52,710 --> 00:02:50,560
of water erupting from the south pole of

76
00:02:54,390 --> 00:02:52,720
this world forming a huge plume

77
00:02:55,910 --> 00:02:54,400
stretching thousands of kilometers in

78
00:02:57,750 --> 00:02:55,920
the space

79
00:02:59,910 --> 00:02:57,760
more recently we learned that just like

80
00:03:02,550 --> 00:02:59,920
jupiter's larger moon europa there is a

81
00:03:05,350 --> 00:03:02,560
global liquid water ocean

82
00:03:07,830 --> 00:03:05,360
under enceladus icy crust

83
00:03:10,550 --> 00:03:07,840
and we also discovered evidence that

84
00:03:12,630 --> 00:03:10,560
there is hydrothermal activity reactions

85
00:03:15,030 --> 00:03:12,640
between the the hot rock and the liquid

86
00:03:16,710 --> 00:03:15,040
water occurring inside enceladus at the

87
00:03:20,229 --> 00:03:16,720
bottom of that ocean

88
00:03:21,910 --> 00:03:20,239

so enceladus is not just an ocean world

89
00:03:23,990 --> 00:03:21,920
it's a world that might provide a

90
00:03:25,270 --> 00:03:24,000
habitable environment for life as we

91
00:03:27,030 --> 00:03:25,280
know it

92
00:03:28,630 --> 00:03:27,040
and while the cassini spacecraft does

93
00:03:31,190 --> 00:03:28,640
not have the instruments needed to

94
00:03:32,229 --> 00:03:31,200
detect life it does have the instruments

95
00:03:34,710 --> 00:03:32,239
that can tell us about the

96
00:03:35,830 --> 00:03:34,720
characteristics of that ocean

97
00:03:37,270 --> 00:03:35,840
and as though it is those

98
00:03:39,509 --> 00:03:37,280
characteristics that control

99
00:03:41,589 --> 00:03:39,519
habitability that control whether or not

100
00:03:44,229 --> 00:03:41,599
life on enceladus is even a remote

101
00:03:46,710 --> 00:03:44,239
possibility

102
00:03:50,149 --> 00:03:46,720
as you can see in the first graphic uh

103
00:03:53,190 --> 00:03:50,159
which shows a cutaway of enceladus uh

104
00:03:55,190 --> 00:03:53,200
the the ocean that we're talking about

105
00:03:57,350 --> 00:03:55,200
covers a huge area

106
00:03:59,910 --> 00:03:57,360
and that's why enceladus is a world that

107
00:04:01,190 --> 00:03:59,920
is becoming a key destination in nasa's

108
00:04:03,270 --> 00:04:01,200
search for life

109
00:04:05,110 --> 00:04:03,280
and on wednesday we will plunge deeper

110
00:04:08,070 --> 00:04:05,120
into that magnificent plume coming from

111
00:04:10,470 --> 00:04:08,080
the south pole than we ever have before

112
00:04:12,949 --> 00:04:10,480
and we will collect the best sample ever

113
00:04:15,030 --> 00:04:12,959

from an ocean beyond earth

114
00:04:17,509 --> 00:04:15,040
and this is an example of where our

115
00:04:19,509 --> 00:04:17,519
passion and ingenuity can take us and

116
00:04:20,789 --> 00:04:19,519
this is an example of what nasa is all

117
00:04:22,629 --> 00:04:20,799
about

118
00:04:24,070 --> 00:04:22,639
so now i'd like to introduce earl mays

119
00:04:26,390 --> 00:04:24,080
from the jet propulsion laboratory in

120
00:04:28,469 --> 00:04:26,400
pasadena earl is the project manager for

121
00:04:31,110 --> 00:04:28,479
the cassini mission

122
00:04:34,310 --> 00:04:31,120
great thanks kurt um we have a rather

123
00:04:37,270 --> 00:04:34,320
prosaic term for this flyby it's e-21

124
00:04:39,350 --> 00:04:37,280
it's our 21st enceladus flyby it's not

125
00:04:41,670 --> 00:04:39,360
our last but arguably this one is going

126
00:04:43,990 --> 00:04:41,680
to be our most most dramatic we're going

127
00:04:46,710 --> 00:04:44,000
to be screaming over the south pole at

128
00:04:49,510 --> 00:04:46,720
around 19 000 miles per hour just 30

129
00:04:50,790 --> 00:04:49,520
kilometers sorry 30 miles above the

130
00:04:52,310 --> 00:04:50,800
surface and we're going to go right

131
00:04:53,749 --> 00:04:52,320
through the plume

132
00:04:56,390 --> 00:04:53,759
we've been in the realm of the icy

133
00:04:58,550 --> 00:04:56,400
satellites now for a few months some of

134
00:05:00,790 --> 00:04:58,560
the enceladus neighbors diony and ria

135
00:05:03,270 --> 00:05:00,800
have been on our our list of targets but

136
00:05:05,510 --> 00:05:03,280
now it's enceladus last couple weeks ago

137
00:05:07,990 --> 00:05:05,520
we had a phenomenal flyby of the north

138
00:05:11,270 --> 00:05:08,000

pole of enceladus first time we have

139
00:05:13,510 --> 00:05:11,280
seen this area of the satellite in

140
00:05:15,670 --> 00:05:13,520
sunlight and now it's the south pole

141
00:05:18,629 --> 00:05:15,680
with the plume i'm speaking to the

142
00:05:20,550 --> 00:05:18,639
graphic uh we have as i said been in the

143
00:05:22,150 --> 00:05:20,560
in the ring plane essentially the icy

144
00:05:25,189 --> 00:05:22,160
satellites and we're now on approach to

145
00:05:26,870 --> 00:05:25,199
enceladus about two hours out we've been

146
00:05:28,710 --> 00:05:26,880
imaging all the way in on approach

147
00:05:30,870 --> 00:05:28,720
imaging as usual as prime coming in but

148
00:05:33,430 --> 00:05:30,880
about two hours out where this animation

149
00:05:34,870 --> 00:05:33,440
is now we will be

150
00:05:36,870 --> 00:05:34,880
rewriting the spacecraft so the

151
00:05:38,390 --> 00:05:36,880
apertures of both our dust analyzer and

152
00:05:39,430 --> 00:05:38,400
spectrometer going right through the

153
00:05:42,150 --> 00:05:39,440
plumes

154
00:05:45,110 --> 00:05:42,160
and if you're watching the animation uh

155
00:05:47,430 --> 00:05:45,120
it is going to be over in an instant we

156
00:05:49,029 --> 00:05:47,440
are going like i said 19 000 miles per

157
00:05:51,749 --> 00:05:49,039
hour through the plumes will just take a

158
00:05:53,830 --> 00:05:51,759
few tens of seconds on the egress we

159
00:05:55,749 --> 00:05:53,840
will have a phenomenal view

160
00:05:57,430 --> 00:05:55,759
of the backlit plumes against the

161
00:05:58,629 --> 00:05:57,440
backdrop of saturn

162
00:06:01,189 --> 00:05:58,639
and the rings

163
00:06:03,029 --> 00:06:01,199

with the data safely on board we will

164
00:06:05,590 --> 00:06:03,039
then begin to reorient the spacecraft

165
00:06:07,909 --> 00:06:05,600
for some final imaging

166
00:06:08,710 --> 00:06:07,919
all that's going to happen about 10 am

167
00:06:11,029 --> 00:06:08,720
on

168
00:06:13,029 --> 00:06:11,039
wednesday morning local time pacific

169
00:06:15,590 --> 00:06:13,039
daylight of specific daylight savings

170
00:06:17,270 --> 00:06:15,600
time we will hear our first call back

171
00:06:19,350 --> 00:06:17,280
from the spacecraft

172
00:06:20,950 --> 00:06:19,360
at about 4 15 that afternoon that will

173
00:06:23,029 --> 00:06:20,960
be just a health and safety call we're

174
00:06:25,749 --> 00:06:23,039
going to reorient the spacecraft for its

175
00:06:27,110 --> 00:06:25,759
next encounter and we will then be able

176
00:06:28,469 --> 00:06:27,120
to play back today over the next couple

177
00:06:31,110 --> 00:06:28,479
of days

178
00:06:33,590 --> 00:06:31,120
although we will be going way too fast

179
00:06:35,909 --> 00:06:33,600
to precisely target the surface at

180
00:06:37,990 --> 00:06:35,919
closest approach we're not going to let

181
00:06:40,390 --> 00:06:38,000
leave imaging out what we'll be able to

182
00:06:42,309 --> 00:06:40,400
do is essentially drag the open

183
00:06:43,270 --> 00:06:42,319
apertures of the instrument both the

184
00:06:45,990 --> 00:06:43,280
height

185
00:06:48,309 --> 00:06:46,000
the narrow angle and wide angle cameras

186
00:06:49,909 --> 00:06:48,319
across the surface shuttering like mad

187
00:06:52,870 --> 00:06:49,919
and if you can look at the ground track

188
00:06:55,189 --> 00:06:52,880

of the maze 2 image now the red line is

189
00:06:57,270 --> 00:06:55,199
the ground track of the cameras those

190
00:06:59,749 --> 00:06:57,280
white circles are the images of the

191
00:07:02,870 --> 00:06:59,759
active areas jets and plumes and or

192
00:07:04,950 --> 00:07:02,880
curtains as you may choose

193
00:07:07,110 --> 00:07:04,960
we hope if you see one of those actually

194
00:07:09,029 --> 00:07:07,120
crosses what we've been calling area 68

195
00:07:11,430 --> 00:07:09,039
which is a very active region at the

196
00:07:13,110 --> 00:07:11,440
lower left and although these images

197
00:07:15,110 --> 00:07:13,120
will be quite dramatically smeared

198
00:07:16,550 --> 00:07:15,120
because of our velocity the imaging

199
00:07:18,309 --> 00:07:16,560
technology should be able to remove the

200
00:07:20,390 --> 00:07:18,319
smear and we should be able to have some

201
00:07:22,230 --> 00:07:20,400
pretty spectacular images for you

202
00:07:24,150 --> 00:07:22,240
one last thing to point out about this

203
00:07:26,710 --> 00:07:24,160
image is that as i pointed out earlier

204
00:07:28,550 --> 00:07:26,720
the north pole is in daylight for the

205
00:07:30,629 --> 00:07:28,560
first time ever unfortunately that means

206
00:07:32,550 --> 00:07:30,639
the south pole is not and so all of

207
00:07:34,710 --> 00:07:32,560
these images will be taken with the

208
00:07:37,270 --> 00:07:34,720
ambient lighting from saturn in other

209
00:07:39,189 --> 00:07:37,280
words saturn shine it'll be a lot like

210
00:07:40,790 --> 00:07:39,199
the moonlight we see in the in a full

211
00:07:42,230 --> 00:07:40,800
moon but this time it's going to be

212
00:07:43,189 --> 00:07:42,240
saturn providing illumination for the

213
00:07:45,270 --> 00:07:43,199

images

214
00:07:47,909 --> 00:07:45,280
and with that i will turn this over to

215
00:07:48,950 --> 00:07:47,919
linda spilker the project scientist or

216
00:07:51,350 --> 00:07:48,960
cassini

217
00:07:53,749 --> 00:07:51,360
thanks earl i'm going to discuss our

218
00:07:56,150 --> 00:07:53,759
planned science and anticipated results

219
00:07:58,150 --> 00:07:56,160
from this incredible flyby

220
00:08:01,510 --> 00:07:58,160
cassini will undertake three main

221
00:08:04,469 --> 00:08:01,520
science activities during this flyby and

222
00:08:06,790 --> 00:08:04,479
each activity is designed to provide

223
00:08:10,070 --> 00:08:06,800
powerful new insights into the

224
00:08:11,909 --> 00:08:10,080
habitability of enceladus ocean we're

225
00:08:14,550 --> 00:08:11,919
going to do that by further studying

226
00:08:16,309 --> 00:08:14,560
both the gas and the particles coming

227
00:08:19,029 --> 00:08:16,319
from the south pole

228
00:08:20,629 --> 00:08:19,039
spilker one shows the four bluish tiger

229
00:08:23,670 --> 00:08:20,639
stripes what you're seeing is a tiny

230
00:08:25,430 --> 00:08:23,680
moon only 300 miles across

231
00:08:26,869 --> 00:08:25,440
those four bluish features are at the

232
00:08:28,950 --> 00:08:26,879
south pole

233
00:08:31,909 --> 00:08:28,960
those tiger stripes this is the source

234
00:08:34,469 --> 00:08:31,919
of the gas and the particles coming from

235
00:08:36,550 --> 00:08:34,479
the south pole of enceladus

236
00:08:39,190 --> 00:08:36,560
the first objective is to confirm the

237
00:08:40,389 --> 00:08:39,200
presence of molecular hydrogen in the

238
00:08:42,230 --> 00:08:40,399

plume gas

239
00:08:44,790 --> 00:08:42,240
and this will provide an independent

240
00:08:47,110 --> 00:08:44,800
line of evidence for the hydrothermal

241
00:08:49,350 --> 00:08:47,120
activity that kurt discussed that's

242
00:08:50,710 --> 00:08:49,360
taking place on the sea floor of

243
00:08:53,190 --> 00:08:50,720
enceladus

244
00:08:55,670 --> 00:08:53,200
the amount of hydrogen emission

245
00:08:56,790 --> 00:08:55,680
will reveal for us how much hydrothermal

246
00:08:58,949 --> 00:08:56,800
activity

247
00:09:01,030 --> 00:08:58,959
is actually occurring

248
00:09:03,509 --> 00:09:01,040
on that seafloor with implications for

249
00:09:06,310 --> 00:09:03,519
the amount of energy that's available

250
00:09:08,870 --> 00:09:06,320
energy a key ingredient for habitability

251
00:09:10,949 --> 00:09:08,880
on enceladus

252
00:09:13,670 --> 00:09:10,959
cassini's second activity is to better

253
00:09:16,150 --> 00:09:13,680
understand the chemistry of the material

254
00:09:19,110 --> 00:09:16,160
in the plume we know we've seen organics

255
00:09:21,910 --> 00:09:19,120
we've seen methane carbon dioxide number

256
00:09:23,829 --> 00:09:21,920
of key ingredients and this in this case

257
00:09:26,150 --> 00:09:23,839
with our much deeper dive through the

258
00:09:28,630 --> 00:09:26,160
plume will have a chance to sample

259
00:09:31,110 --> 00:09:28,640
potentially larger particles and the

260
00:09:32,310 --> 00:09:31,120
greater density of both the gas and the

261
00:09:34,710 --> 00:09:32,320
particles

262
00:09:37,430 --> 00:09:34,720
and we might find new organics that we

263
00:09:39,430 --> 00:09:37,440

haven't seen previously or adjust at the

264
00:09:41,910 --> 00:09:39,440
limits of our detection

265
00:09:44,150 --> 00:09:41,920
in spilker2 you can see a video of the

266
00:09:45,829 --> 00:09:44,160
plume's continuous emission

267
00:09:47,190 --> 00:09:45,839
keep in mind the south pole is in

268
00:09:50,470 --> 00:09:47,200
darkness so there'll be actually a

269
00:09:53,430 --> 00:09:50,480
shadow line across the plume we'll get

270
00:09:55,509 --> 00:09:53,440
in particular images as we fly outbound

271
00:09:57,590 --> 00:09:55,519
in what we call forward scattered light

272
00:09:58,949 --> 00:09:57,600
to look at this plume coming out of

273
00:10:01,110 --> 00:09:58,959
enceladus

274
00:10:03,990 --> 00:10:01,120
and the third and final activity is to

275
00:10:05,750 --> 00:10:04,000
turn to determine the nature of these

276
00:10:08,230 --> 00:10:05,760
plume sources

277
00:10:10,790 --> 00:10:08,240
what we wonder are the plumes created by

278
00:10:13,190 --> 00:10:10,800
tight column-like jets

279
00:10:15,509 --> 00:10:13,200
or curtain-like eruptions that run along

280
00:10:18,310 --> 00:10:15,519
the length of each tiger tiger strike

281
00:10:19,990 --> 00:10:18,320
fracture if you look at spoken three you

282
00:10:22,069 --> 00:10:20,000
can see that there's evidence perhaps

283
00:10:24,710 --> 00:10:22,079
for jets but also these curtains of

284
00:10:26,710 --> 00:10:24,720
emission and this is an ongoing source

285
00:10:28,949 --> 00:10:26,720
of debate within the scientific

286
00:10:30,389 --> 00:10:28,959
community about just what this emission

287
00:10:32,710 --> 00:10:30,399
looks like

288
00:10:36,069 --> 00:10:32,720

it also has major implications for how

289
00:10:37,670 --> 00:10:36,079
long enceladus might have been active

290
00:10:39,750 --> 00:10:37,680
and keep in mind again that the south

291
00:10:41,750 --> 00:10:39,760
pole is dark but we'll see the plume as

292
00:10:43,110 --> 00:10:41,760
they go up above the surface of

293
00:10:44,949 --> 00:10:43,120
enceladus

294
00:10:47,110 --> 00:10:44,959
we'll get images both inbound and

295
00:10:49,110 --> 00:10:47,120
outbound on this flyby

296
00:10:51,030 --> 00:10:49,120
and we'll have a first chance to look at

297
00:10:53,590 --> 00:10:51,040
the gas and particle data within about a

298
00:10:55,269 --> 00:10:53,600
week of the flyby a first quick look

299
00:10:57,990 --> 00:10:55,279
and then over the coming weeks we'll do

300
00:11:00,790 --> 00:10:58,000
a more detailed analysis to really help

301
00:11:03,509 --> 00:11:00,800
us understand what's going on in that

302
00:11:05,750 --> 00:11:03,519
tantalizing ocean on enceladus

303
00:11:08,949 --> 00:11:05,760
and this flyby may help us unlock more

304
00:11:11,430 --> 00:11:08,959
details about the habitability of this

305
00:11:12,630 --> 00:11:11,440
very tiny ocean world

306
00:11:14,630 --> 00:11:12,640
and with that

307
00:11:15,990 --> 00:11:14,640
back to you kurt for some concluding

308
00:11:18,389 --> 00:11:16,000
remarks

309
00:11:20,630 --> 00:11:18,399
thank you linda uh as i mentioned this

310
00:11:22,069 --> 00:11:20,640
this flyby can't detect life since we

311
00:11:23,990 --> 00:11:22,079
don't have the necessary instruments for

312
00:11:26,230 --> 00:11:24,000
that but it will provide powerful

313
00:11:28,630 --> 00:11:26,240

insights as to how habitable the ocean

314
00:11:30,230 --> 00:11:28,640
inside enceladus might be insights which

315
00:11:32,310 --> 00:11:30,240
linda just described

316
00:11:34,630 --> 00:11:32,320
so i hope we've given you a good idea of

317
00:11:37,350 --> 00:11:34,640
what this flyby means and how very

318
00:11:39,030 --> 00:11:37,360
exciting it is for the the cassini team

319
00:11:41,670 --> 00:11:39,040
and i hope we've also given you an idea

320
00:11:43,670 --> 00:11:41,680
of how exciting it is not just for us

321
00:11:46,230 --> 00:11:43,680
but for everyone every every single one

322
00:11:49,190 --> 00:11:46,240
of us on this planet this is a very big

323
00:11:51,030 --> 00:11:49,200
step in a new era of exploring ocean

324
00:11:54,310 --> 00:11:51,040
worlds in our solar system these are

325
00:11:56,230 --> 00:11:54,320
worlds with huge bodies of liquid water

326
00:11:57,990 --> 00:11:56,240
underneath their surfaces bodies with

327
00:12:00,069 --> 00:11:58,000
great potential

328
00:12:01,990 --> 00:12:00,079
to provide oasis for life throughout our

329
00:12:04,230 --> 00:12:02,000
solar system it's a journey and

330
00:12:06,550 --> 00:12:04,240
understanding about what makes a world

331
00:12:08,310 --> 00:12:06,560
habitable and where we might find life

332
00:12:10,710 --> 00:12:08,320
and where we might one day live

333
00:12:13,670 --> 00:12:10,720
ourselves and everyone is invited to

334
00:12:15,509 --> 00:12:13,680
join us on this journey

335
00:12:17,670 --> 00:12:15,519
thanks kurt and thanks to a fantastic

336
00:12:19,670 --> 00:12:17,680
cassini team so ladies and gentlemen uh

337
00:12:21,110 --> 00:12:19,680
nice and to the point and we've got

338
00:12:23,269 --> 00:12:21,120

plenty of time for questions so we're

339
00:12:24,790 --> 00:12:23,279
now going to transition into q a i'm

340
00:12:26,550 --> 00:12:24,800
gonna turn it over to the operator to

341
00:12:28,230 --> 00:12:26,560
help facilitate that uh we'll take

342
00:12:30,069 --> 00:12:28,240
several questions from the media and

343
00:12:31,750 --> 00:12:30,079
then we're gonna go to social media um

344
00:12:33,670 --> 00:12:31,760
with getting

345
00:12:34,629 --> 00:12:33,680
lots of lots of conversation so we'll

346
00:12:35,990 --> 00:12:34,639
have them

347
00:12:39,030 --> 00:12:36,000
get a chance to answer some questions

348
00:12:40,949 --> 00:12:39,040
then we'll go back to media so with that

349
00:12:42,069 --> 00:12:40,959
uh operator over to you

350
00:12:44,389 --> 00:12:42,079
thank you at this time we're ready to

351
00:12:46,069 --> 00:12:44,399
begin the question and answer session if

352
00:12:48,710 --> 00:12:46,079
you would like to ask a question please

353
00:12:50,870 --> 00:12:48,720
press star one you will be prompted to

354
00:12:53,190 --> 00:12:50,880
record your name to withdraw your

355
00:12:55,829 --> 00:12:53,200
question you may press star 2

356
00:12:59,509 --> 00:12:55,839
against r1 to ask a question in one

357
00:13:03,910 --> 00:13:00,949
i think our first question comes from

358
00:13:07,190 --> 00:13:03,920
greg redfern with wtop radio space

359
00:13:09,430 --> 00:13:07,200
reporter you may ask your question

360
00:13:12,069 --> 00:13:09,440
thank you for taking my call this is for

361
00:13:14,069 --> 00:13:12,079
earl or linda and what an exciting

362
00:13:16,310 --> 00:13:14,079
mission but i have essentially two

363
00:13:18,949 --> 00:13:16,320

related questions have you already

364
00:13:22,870 --> 00:13:18,959
identified the plume that you want to

365
00:13:24,470 --> 00:13:22,880
fly through or is there a constant

366
00:13:26,790 --> 00:13:24,480
stream of clues

367
00:13:28,790 --> 00:13:26,800
that casino will fly by

368
00:13:32,069 --> 00:13:28,800
and number two

369
00:13:34,550 --> 00:13:32,079
exactly or how much light do you expect

370
00:13:35,670 --> 00:13:34,560
to fall on the south pole

371
00:13:37,910 --> 00:13:35,680
of the moon

372
00:13:41,190 --> 00:13:37,920
from saturn thank you so much and a

373
00:13:43,190 --> 00:13:41,200
great mission congratulations

374
00:13:45,670 --> 00:13:43,200
okay the plume of enceladus is

375
00:13:47,670 --> 00:13:45,680
continuously erupting we've seen it

376
00:13:50,550 --> 00:13:47,680
throughout the mission and so i'll be

377
00:13:52,790 --> 00:13:50,560
flying through that plume perhaps even

378
00:13:55,030 --> 00:13:52,800
helping resolve the question of the jets

379
00:13:56,069 --> 00:13:55,040
versus the curtains as you could see

380
00:13:58,790 --> 00:13:56,079
from that

381
00:14:00,389 --> 00:13:58,800
red line on maze 2 that we're going to

382
00:14:03,189 --> 00:14:00,399
be going across what appear to be

383
00:14:05,350 --> 00:14:03,199
discrete sources and going close enough

384
00:14:07,750 --> 00:14:05,360
to perhaps determine if they are

385
00:14:09,670 --> 00:14:07,760
discrete sources or part of a larger

386
00:14:11,910 --> 00:14:09,680
curtain

387
00:14:13,990 --> 00:14:11,920
as far as the intensity of light falling

388
00:14:16,150 --> 00:14:14,000

on the the moon from saturn it's going

389
00:14:17,990 --> 00:14:16,160
to be much much less than the light

390
00:14:19,910 --> 00:14:18,000
coming from a full moon

391
00:14:22,069 --> 00:14:19,920
saturn is 10 times further away from the

392
00:14:25,030 --> 00:14:22,079
sun than the earth is so you've got like

393
00:14:26,870 --> 00:14:25,040
a factor of 100 decrease in that light

394
00:14:29,509 --> 00:14:26,880
so it'll be dim light but we have very

395
00:14:32,389 --> 00:14:29,519
very capable cameras and we've done this

396
00:14:34,069 --> 00:14:32,399
before looking at the dark side of moons

397
00:14:35,910 --> 00:14:34,079
and saturn shines so we'll be able to

398
00:14:38,629 --> 00:14:35,920
get something out of it our exposures

399
00:14:41,189 --> 00:14:38,639
will be long so some of those images

400
00:14:42,790 --> 00:14:41,199
very close to the south pole may be

401
00:14:44,389 --> 00:14:42,800
smeared but we think with some

402
00:14:46,550 --> 00:14:44,399
processing we can take some of that

403
00:14:49,350 --> 00:14:46,560
smear away and i might add that

404
00:14:56,389 --> 00:14:49,360
enceladus enceladus is very bright which

405
00:15:04,629 --> 00:14:57,670
thank you are you ready for the next

406
00:15:07,910 --> 00:15:07,030
and are you ready for the next question

407
00:15:09,430 --> 00:15:07,920
yes

408
00:15:11,829 --> 00:15:09,440
thank you the next question just comes

409
00:15:13,430 --> 00:15:11,839
from bill harwood with cbs news go ahead

410
00:15:15,509 --> 00:15:13,440
with your question

411
00:15:16,870 --> 00:15:15,519
thanks and i have uh two very quick ones

412
00:15:18,710 --> 00:15:16,880
one for earl and one for linda if i

413
00:15:20,310 --> 00:15:18,720

could um

414
00:15:21,509 --> 00:15:20,320
earl i think you or someone once said

415
00:15:23,189 --> 00:15:21,519
this is kind of like flying through

416
00:15:25,430 --> 00:15:23,199
smoke i just was looking for some

417
00:15:26,710 --> 00:15:25,440
general comments on safety of the

418
00:15:28,150 --> 00:15:26,720
spacecraft and whether you would have

419
00:15:29,030 --> 00:15:28,160
done something like this earlier in the

420
00:15:30,550 --> 00:15:29,040
mission

421
00:15:31,829 --> 00:15:30,560
than now where you're toward the end of

422
00:15:33,590 --> 00:15:31,839
it does that make the risk a little more

423
00:15:35,030 --> 00:15:33,600
acceptable and for one now you may have

424
00:15:36,949 --> 00:15:35,040
said this i had to step out for 30

425
00:15:39,110 --> 00:15:36,959
seconds and i apologize but are we

426
00:15:41,430 --> 00:15:39,120
thinking title heating alone

427
00:15:43,110 --> 00:15:41,440
is responsible for keeping this ocean uh

428
00:15:45,269 --> 00:15:43,120
liquid or is there a component of

429
00:15:47,670 --> 00:15:45,279
radioactivity that's doing this or is it

430
00:15:49,430 --> 00:15:47,680
mostly tidal thanks

431
00:15:51,189 --> 00:15:49,440
uh yeah that would have been me i would

432
00:15:54,069 --> 00:15:51,199
have said something like that or through

433
00:15:56,069 --> 00:15:54,079
steam or vapor uh we have flown through

434
00:15:58,389 --> 00:15:56,079
the plumes before at a higher altitude

435
00:16:00,629 --> 00:15:58,399
not quite so dense and so yeah this is a

436
00:16:02,230 --> 00:16:00,639
little bit riskier but not that much we

437
00:16:03,829 --> 00:16:02,240
really feel like we're taking a very

438
00:16:05,189 --> 00:16:03,839

prudent approach

439
00:16:06,389 --> 00:16:05,199
at this point in the mission we still

440
00:16:08,310 --> 00:16:06,399
have a couple years left a lot of

441
00:16:09,829 --> 00:16:08,320
exciting stuff still to do so we're not

442
00:16:12,949 --> 00:16:09,839
going to risk everything on this one

443
00:16:14,150 --> 00:16:12,959
flyby um

444
00:16:16,310 --> 00:16:14,160
does that help

445
00:16:17,829 --> 00:16:16,320
yeah i could add that department

446
00:16:21,110 --> 00:16:17,839
the particles themselves we think are on

447
00:16:23,670 --> 00:16:21,120
the order of about 30 microns or so so

448
00:16:27,110 --> 00:16:23,680
very very tiny particles

449
00:16:29,430 --> 00:16:27,120
and very diffuse also and spread out

450
00:16:32,069 --> 00:16:29,440
as far as the the source of the energy

451
00:16:34,629 --> 00:16:32,079
for enceladus we think it's primarily

452
00:16:38,310 --> 00:16:34,639
tidal heating a lot of the radiogenic

453
00:16:39,829 --> 00:16:38,320
heating has since gone away so we think

454
00:16:41,749 --> 00:16:39,839
it's primarily tidal heating although

455
00:16:43,670 --> 00:16:41,759
there still is a puzzle

456
00:16:46,150 --> 00:16:43,680
because tidal heating as we best

457
00:16:48,949 --> 00:16:46,160
understand it doesn't quite provide

458
00:16:49,829 --> 00:16:48,959
enough energy to maintain and solace's

459
00:16:52,310 --> 00:16:49,839
ocean

460
00:16:54,389 --> 00:16:52,320
liquid perhaps from the time it formed

461
00:16:57,749 --> 00:16:54,399
so we're working on that one

462
00:17:02,150 --> 00:16:59,670
thank you our next question comes from

463
00:17:05,750 --> 00:17:02,160

irene klotz with discovery news you may

464
00:17:07,429 --> 00:17:05,760
ask your question thanks very much um i

465
00:17:10,230 --> 00:17:07,439
have two questions uh the first one for

466
00:17:11,590 --> 00:17:10,240
earl what was the previous uh closest

467
00:17:12,710 --> 00:17:11,600
encounter

468
00:17:15,590 --> 00:17:12,720
over the

469
00:17:18,870 --> 00:17:15,600
enceladus southern pole and

470
00:17:21,590 --> 00:17:18,880
for linda i understand that

471
00:17:24,309 --> 00:17:21,600
cassini is not a life-detecting

472
00:17:25,990 --> 00:17:24,319
mission at all but is there any chance

473
00:17:28,549 --> 00:17:26,000
at all that

474
00:17:31,029 --> 00:17:28,559
the analysis of the

475
00:17:32,630 --> 00:17:31,039
the gases and the dust could

476
00:17:35,430 --> 00:17:32,640
turn up anything

477
00:17:37,909 --> 00:17:35,440
that would kind of shed light on bio

478
00:17:40,470 --> 00:17:37,919
signatures at all or is that for another

479
00:17:41,430 --> 00:17:40,480
mission thanks

480
00:17:44,950 --> 00:17:41,440
yeah

481
00:17:48,310 --> 00:17:44,960
next closest uh to the plumes was 50

482
00:17:53,350 --> 00:17:50,710
and uh not through the densest part of

483
00:17:55,270 --> 00:17:53,360
the plumes as we're doing now

484
00:17:57,350 --> 00:17:55,280
yes over the south pole it was about 50

485
00:18:00,150 --> 00:17:57,360
miles so we're we are going considerably

486
00:18:04,150 --> 00:18:00,160
closer but i think our closest flyby of

487
00:18:06,710 --> 00:18:04,160
enceladus um was 15 miles right uh but

488
00:18:08,710 --> 00:18:06,720

that was not through the plumes

489
00:18:10,870 --> 00:18:08,720
so we're not concerned we know exactly

490
00:18:14,710 --> 00:18:10,880
where we are where enceladus is uh the

491
00:18:17,190 --> 00:18:14,720
plume density that we're working on now

492
00:18:19,750 --> 00:18:17,200
as far as the the life detection with

493
00:18:23,270 --> 00:18:19,760
cassini we can really only detect

494
00:18:25,669 --> 00:18:23,280
complex organics we don't have the range

495
00:18:26,950 --> 00:18:25,679
of mass detection to find anything that

496
00:18:28,870 --> 00:18:26,960
would

497
00:18:30,549 --> 00:18:28,880
dna or or

498
00:18:32,789 --> 00:18:30,559
larger molecules that would indicate

499
00:18:36,150 --> 00:18:32,799
life but we can really do a lot with

500
00:18:38,789 --> 00:18:36,160
cassini to address how habitable is that

501
00:18:41,510 --> 00:18:38,799
ocean on enceladus so it really remains

502
00:18:44,150 --> 00:18:41,520
for another mission uh perhaps a series

503
00:18:46,630 --> 00:18:44,160
of flybys with the right instrumentation

504
00:18:48,870 --> 00:18:46,640
maybe an enceladus orbiter or perhaps a

505
00:18:51,350 --> 00:18:48,880
sample return mission to bring back

506
00:18:53,110 --> 00:18:51,360
samples of that material then use the

507
00:18:56,710 --> 00:18:53,120
sophisticated instruments on earth to

508
00:18:58,390 --> 00:18:56,720
take a look at that material

509
00:19:01,270 --> 00:18:58,400
thank you our next question comes from

510
00:19:03,510 --> 00:19:01,280
jason ryan with spaceflighterinsider.com

511
00:19:05,510 --> 00:19:03,520
go ahead with your question

512
00:19:07,510 --> 00:19:05,520
i'm sorry bill already asked my question

513
00:19:11,190 --> 00:19:07,520

thank you

514
00:19:12,789 --> 00:19:11,200
from peter spots with the christian

515
00:19:14,310 --> 00:19:12,799
science monitor we'll have with your

516
00:19:15,990 --> 00:19:14,320
questions well thank you very much for

517
00:19:18,630 --> 00:19:16,000
doing this and i think this is for uh

518
00:19:21,510 --> 00:19:18,640
linda spoelker i wonder if you could uh

519
00:19:23,350 --> 00:19:21,520
return to the curtain versus uh

520
00:19:25,830 --> 00:19:23,360
sort of collimated plume

521
00:19:27,750 --> 00:19:25,840
idea and kind of give us a sense for

522
00:19:28,630 --> 00:19:27,760
what difference that makes to what ideas

523
00:19:34,390 --> 00:19:28,640
about

524
00:19:37,909 --> 00:19:35,990
in the case of the jets you'd have

525
00:19:40,070 --> 00:19:37,919
discrete individual you can think of

526
00:19:41,909 --> 00:19:40,080
like little nozzles spraying out this

527
00:19:43,830 --> 00:19:41,919
material into space

528
00:19:46,070 --> 00:19:43,840
whereas in the curtain analogy it would

529
00:19:46,870 --> 00:19:46,080
be more like a continuous crack that's

530
00:19:49,270 --> 00:19:46,880
open

531
00:19:52,390 --> 00:19:49,280
similar to a lava curtain that you might

532
00:19:54,630 --> 00:19:52,400
see in hawaii and so it just helps us

533
00:19:56,630 --> 00:19:54,640
better understand how do you interact

534
00:19:57,350 --> 00:19:56,640
through the ice shell

535
00:19:59,029 --> 00:19:57,360
up

536
00:20:00,310 --> 00:19:59,039
onto the surface and so that's what

537
00:20:02,070 --> 00:20:00,320
we're trying to

538
00:20:03,990 --> 00:20:02,080

figure out the difference between those

539
00:20:04,830 --> 00:20:04,000
two

540
00:20:09,430 --> 00:20:04,840
thank

541
00:20:11,430 --> 00:20:09,440
alexandra whitsey with nature magazine

542
00:20:13,669 --> 00:20:11,440
let me ask your question

543
00:20:15,350 --> 00:20:13,679
yes thanks for taking my question um i

544
00:20:17,110 --> 00:20:15,360
think my question is for earl i just

545
00:20:19,590 --> 00:20:17,120
wanted to ask specifically about the

546
00:20:21,750 --> 00:20:19,600
timing of when we're expecting perhaps

547
00:20:24,310 --> 00:20:21,760
the most dramatic images from the

548
00:20:29,750 --> 00:20:27,029
what i would expect would be sometime

549
00:20:31,750 --> 00:20:29,760
late in the evening of thursday

550
00:20:34,310 --> 00:20:31,760
we have a track right after the flyby

551
00:20:35,990 --> 00:20:34,320
but because of the way the orbital

552
00:20:38,149 --> 00:20:36,000
dynamics are we've got to do a cleanup

553
00:20:40,149 --> 00:20:38,159
maneuver right then so we won't get much

554
00:20:41,590 --> 00:20:40,159
playback on the first day

555
00:20:43,830 --> 00:20:41,600
the second day we've got one of the

556
00:20:45,750 --> 00:20:43,840
largest antennas down in canberra 70

557
00:20:48,310 --> 00:20:45,760
meter playing back all day but it starts

558
00:20:51,430 --> 00:20:48,320
about 4 15 in the afternoon so the

559
00:20:53,750 --> 00:20:51,440
imaging and all of the the close closest

560
00:20:55,430 --> 00:20:53,760
encounter flyby data will come back then

561
00:20:57,270 --> 00:20:55,440
it's going to take some time to process

562
00:20:59,350 --> 00:20:57,280
and clean them up i wouldn't hold out

563
00:21:01,669 --> 00:20:59,360

hope for anything before thursday

564
00:21:03,909 --> 00:21:01,679
evening and most likely friday or into

565
00:21:05,669 --> 00:21:03,919
the weekend because of the complexities

566
00:21:09,430 --> 00:21:05,679
of removing the smear

567
00:21:12,950 --> 00:21:11,350
so operator this is dwayne brown we are

568
00:21:14,630 --> 00:21:12,960
going to

569
00:21:15,750 --> 00:21:14,640
come back to the media calls we're going

570
00:21:22,390 --> 00:21:15,760
to

571
00:21:24,149 --> 00:21:22,400
social media manager uh we're gonna take

572
00:21:25,510 --> 00:21:24,159
uh several questions from social media

573
00:21:27,270 --> 00:21:25,520
then we'll come back with your media

574
00:21:28,470 --> 00:21:27,280
calls jason

575
00:21:30,310 --> 00:21:28,480
sure our first question comes from

576
00:21:32,310 --> 00:21:30,320
twitter user sam who asked will the

577
00:21:35,110 --> 00:21:32,320
plumes alter the course of the cassini

578
00:21:38,149 --> 00:21:35,909
no

579
00:21:40,070 --> 00:21:38,159
it's we're going so fast and it's really

580
00:21:41,830 --> 00:21:40,080
so so diffused that it will have a

581
00:21:43,350 --> 00:21:41,840
little it'll have no effect that we can

582
00:21:45,830 --> 00:21:43,360
measure on the trajectory of the

583
00:21:47,669 --> 00:21:45,840
spacecraft

584
00:21:49,590 --> 00:21:47,679
great next question comes from twitter

585
00:21:51,909 --> 00:21:49,600
user melanie who asks what would

586
00:21:56,310 --> 00:21:51,919
resolving the jets vs curtains question

587
00:22:00,549 --> 00:21:57,990
resolving this question would tell us

588
00:22:02,710 --> 00:22:00,559

about how the ocean is interacting with

589
00:22:05,350 --> 00:22:02,720
the surface whether you have individual

590
00:22:07,909 --> 00:22:05,360
little conduits coming up or basically

591
00:22:09,990 --> 00:22:07,919
sort of a an open crack that goes all

592
00:22:11,029 --> 00:22:10,000
the way to the bottom of the ocean and

593
00:22:13,270 --> 00:22:11,039
this would just help us better

594
00:22:14,950 --> 00:22:13,280
understand this interaction and maybe

595
00:22:16,950 --> 00:22:14,960
tell us more about the

596
00:22:20,630 --> 00:22:16,960
thermal energy also coming out of these

597
00:22:24,789 --> 00:22:22,230
our next question comes from twitter

598
00:22:26,870 --> 00:22:24,799
user david who asks what hypotheses are

599
00:22:30,950 --> 00:22:26,880
there about why the geysers only occur

600
00:22:35,510 --> 00:22:32,950
that's a very good question and one

601
00:22:37,110 --> 00:22:35,520
we've pondered about our flyby just two

602
00:22:40,230 --> 00:22:37,120
weeks ago we looked carefully at the

603
00:22:41,909 --> 00:22:40,240
north pole for possible evidence of

604
00:22:43,270 --> 00:22:41,919
activity that may have occurred there in

605
00:22:44,789 --> 00:22:43,280
the past

606
00:22:46,630 --> 00:22:44,799
we think that for some reason that

607
00:22:48,230 --> 00:22:46,640
there's a just a region there at the

608
00:22:50,470 --> 00:22:48,240
south pole maybe it didn't start out at

609
00:22:52,549 --> 00:22:50,480
the south pole but perhaps a weaker

610
00:22:54,549 --> 00:22:52,559
region closer to the ocean

611
00:22:56,470 --> 00:22:54,559
develop these fractures and then perhaps

612
00:22:58,870 --> 00:22:56,480
it actually rotated down to the south

613
00:23:01,350 --> 00:22:58,880

pole going to one or the other poles is

614
00:23:05,270 --> 00:23:01,360
the the most favorable orientation from

615
00:23:09,510 --> 00:23:06,789
wonderful next question comes from

616
00:23:11,270 --> 00:23:09,520
twitter user james who asks habitability

617
00:23:14,630 --> 00:23:11,280
what life forms do you imagine could be

618
00:23:19,669 --> 00:23:17,029
well if we use an analogy to earth's

619
00:23:21,830 --> 00:23:19,679
oceans and the kinds of life you find

620
00:23:24,230 --> 00:23:21,840
near the hydrothermal vents

621
00:23:25,990 --> 00:23:24,240
you could perhaps have a very diverse

622
00:23:27,909 --> 00:23:26,000
kind of life there if it's very similar

623
00:23:29,750 --> 00:23:27,919
to what we see on the earth from maybe

624
00:23:32,149 --> 00:23:29,760
small kind of diatoms you know

625
00:23:35,350 --> 00:23:32,159
individual cell creatures perhaps up to

626
00:23:37,190 --> 00:23:35,360
things that are even more complex

627
00:23:39,510 --> 00:23:37,200
and and one more and then operator we

628
00:23:41,270 --> 00:23:39,520
will go back to the media calls uh so

629
00:23:43,750 --> 00:23:41,280
one more social media and then back to

630
00:23:45,510 --> 00:23:43,760
you operator just following on same

631
00:23:47,510 --> 00:23:45,520
theme as the last question twitter user

632
00:23:50,630 --> 00:23:47,520
carlton asks if life exists in the

633
00:23:51,750 --> 00:23:50,640
enceladus subsurface ocean how advanced

634
00:23:54,789 --> 00:23:51,760
could it be

635
00:23:58,230 --> 00:23:56,950
that's an intriguing question again if

636
00:24:00,630 --> 00:23:58,240
you use the

637
00:24:02,710 --> 00:24:00,640
hydrothermal vents on the earth seafloor

638
00:24:05,270 --> 00:24:02,720

you don't tend to get extremely advanced

639
00:24:07,029 --> 00:24:05,280
kinds of life there's no sunlight there

640
00:24:09,510 --> 00:24:07,039
you're in liquid water you might get

641
00:24:11,909 --> 00:24:09,520
tiny fish something like that so

642
00:24:16,070 --> 00:24:11,919
certainly not advanced to the to

643
00:24:17,669 --> 00:24:16,080
advancement of like human human beings

644
00:24:20,230 --> 00:24:17,679
but i i think the the important

645
00:24:22,310 --> 00:24:20,240
discovery that life would generate uh

646
00:24:24,950 --> 00:24:22,320
regardless of how complex it was whether

647
00:24:27,590 --> 00:24:24,960
it was just bacteria or fish or or

648
00:24:30,710 --> 00:24:27,600
whatever the important aspect of that is

649
00:24:34,390 --> 00:24:30,720
that life exists somewhere else and if

650
00:24:37,350 --> 00:24:34,400
it if it arose twice in one solar system

651
00:24:39,510 --> 00:24:37,360
the implications for how probable and

652
00:24:44,149 --> 00:24:39,520
how frequent it arises in the universe

653
00:24:48,630 --> 00:24:46,149
so operator this is uh dwane brown if we

654
00:24:51,269 --> 00:24:48,640
can go ahead and uh continue with the

655
00:24:53,269 --> 00:24:51,279
media call in and just go down the list

656
00:24:55,430 --> 00:24:53,279
please thank you our next question comes

657
00:24:57,029 --> 00:24:55,440
from tracy watson with usa today go

658
00:24:59,909 --> 00:24:57,039
ahead with your question

659
00:25:01,990 --> 00:24:59,919
thanks could dr spilker talk about what

660
00:25:03,830 --> 00:25:02,000
it would mean to find different levels

661
00:25:05,029 --> 00:25:03,840
of hydrogen you know what what will that

662
00:25:07,269 --> 00:25:05,039
tell you and how does that relate to

663
00:25:08,950 --> 00:25:07,279

habitability and i take it there was

664
00:25:10,470 --> 00:25:08,960
some question about earlier measurements

665
00:25:11,909 --> 00:25:10,480
and whether the hydrogen levels you saw

666
00:25:12,710 --> 00:25:11,919
were an artifact or whether they really

667
00:25:14,470 --> 00:25:12,720
were

668
00:25:16,870 --> 00:25:14,480
representative of the plume do you think

669
00:25:18,710 --> 00:25:16,880
you've got that lit thanks

670
00:25:21,430 --> 00:25:18,720
we're configuring our ion and neutral

671
00:25:23,990 --> 00:25:21,440
mass spectrometer in a mode where it

672
00:25:25,750 --> 00:25:24,000
will be most sensitive to detecting

673
00:25:27,350 --> 00:25:25,760
molecular hydrogen

674
00:25:30,549 --> 00:25:27,360
and so we'll be looking for that we

675
00:25:32,470 --> 00:25:30,559
expect to see it coming if you again use

676
00:25:33,510 --> 00:25:32,480
the analogy of the hydrothermal vents on

677
00:25:35,110 --> 00:25:33,520
the earth

678
00:25:37,110 --> 00:25:35,120
and so in that case we're going to try

679
00:25:39,669 --> 00:25:37,120
and look for it the amount of hydrogen

680
00:25:41,669 --> 00:25:39,679
would simply be a reflection of the

681
00:25:43,350 --> 00:25:41,679
amount of activity of hydrothermal

682
00:25:46,789 --> 00:25:43,360
activity

683
00:25:49,110 --> 00:25:46,799
taking place in enceladus's ocean

684
00:25:50,950 --> 00:25:49,120
and how does that reflect whether or not

685
00:25:52,630 --> 00:25:50,960
there's life if you if you see if you

686
00:25:54,310 --> 00:25:52,640
see a kind of a threshold amount would

687
00:25:55,590 --> 00:25:54,320
you say oh pretty pretty likely that we

688
00:25:56,870 --> 00:25:55,600

have some kind of bacterial activity

689
00:25:58,549 --> 00:25:56,880
there

690
00:26:00,470 --> 00:25:58,559
uh that's a tougher one to say just we

691
00:26:02,710 --> 00:26:00,480
can just say the amount of hydro thermal

692
00:26:04,630 --> 00:26:02,720
activity is greater than we initially

693
00:26:06,070 --> 00:26:04,640
thought or perhaps less than we

694
00:26:08,149 --> 00:26:06,080
initially thought we definitely think

695
00:26:09,430 --> 00:26:08,159
there's hydrothermal activity there this

696
00:26:14,789 --> 00:26:09,440
would just tell us something about the

697
00:26:18,230 --> 00:26:16,470
next question operator thank you this

698
00:26:20,230 --> 00:26:18,240
question comes from mark with aviation

699
00:26:21,510 --> 00:26:20,240
week in space technology go ahead with

700
00:26:24,230 --> 00:26:21,520
your question

701
00:26:28,789 --> 00:26:24,240
thanks i wonder if you might uh further

702
00:26:30,310 --> 00:26:28,799
characterize the sort of molecular uh

703
00:26:32,789 --> 00:26:30,320
chemistry you're looking for in the

704
00:26:35,830 --> 00:26:32,799
plumes what would be intriguing to you

705
00:26:36,870 --> 00:26:35,840
at this point based on what you know and

706
00:26:38,070 --> 00:26:36,880
you might

707
00:26:39,990 --> 00:26:38,080
um add

708
00:26:42,470 --> 00:26:40,000
the kinds of elements that might be in

709
00:26:45,029 --> 00:26:42,480
these molecular structures

710
00:26:46,470 --> 00:26:45,039
and just a second question

711
00:26:47,669 --> 00:26:46,480
how might your

712
00:26:49,830 --> 00:26:47,679
findings

713
00:26:53,110 --> 00:26:49,840

help inform a europa mission in the

714
00:26:57,350 --> 00:26:55,750
okay as far as the molecular structures

715
00:26:59,269 --> 00:26:57,360
that we might find

716
00:27:01,190 --> 00:26:59,279
both of our spectrometers both for the

717
00:27:04,230 --> 00:27:01,200
gas and the particles

718
00:27:05,990 --> 00:27:04,240
can detect molecules up to a size about

719
00:27:08,390 --> 00:27:06,000
a hundred atomic mass units you can

720
00:27:10,470 --> 00:27:08,400
think of that as protons and neutrons

721
00:27:12,789 --> 00:27:10,480
and so we can't detect anything any

722
00:27:14,390 --> 00:27:12,799
bigger than that particular mass range

723
00:27:16,630 --> 00:27:14,400
but we can detect

724
00:27:17,909 --> 00:27:16,640
fragments from larger molecules and we

725
00:27:20,630 --> 00:27:17,919
expect to see

726
00:27:23,510 --> 00:27:20,640
we've seen methane ethane

727
00:27:25,510 --> 00:27:23,520
some of the shorter chained hydrocarbons

728
00:27:29,190 --> 00:27:25,520
and we expect then to see perhaps the

729
00:27:31,269 --> 00:27:29,200
longer chain hydrocarbons maybe c6 c7

730
00:27:34,950 --> 00:27:31,279
you know c8 c9

731
00:27:36,870 --> 00:27:34,960
as as part of that activity going on

732
00:27:39,510 --> 00:27:36,880
as far as the relationship to the europa

733
00:27:41,350 --> 00:27:39,520
mission curt you want to take that

734
00:27:43,190 --> 00:27:41,360
sure i think there's there's a few areas

735
00:27:44,789 --> 00:27:43,200
this could help for europa mission first

736
00:27:47,590 --> 00:27:44,799
and foremost

737
00:27:48,789 --> 00:27:47,600
if we see a difference in the plume

738
00:27:50,390 --> 00:27:48,799

composition

739
00:27:52,470 --> 00:27:50,400
and plume measurements based upon

740
00:27:54,310 --> 00:27:52,480
altitude above the surface what that

741
00:27:55,990 --> 00:27:54,320
tells us for europa is that we need to

742
00:27:58,230 --> 00:27:56,000
be sure that we plan the mission such

743
00:27:59,909 --> 00:27:58,240
that it can get very close

744
00:28:01,350 --> 00:27:59,919
to the plume

745
00:28:03,590 --> 00:28:01,360
origin

746
00:28:05,750 --> 00:28:03,600
secondly what it can tell us is how to

747
00:28:07,750 --> 00:28:05,760
fine-tune the instruments that we're

748
00:28:09,909 --> 00:28:07,760
going to carry along with us they're

749
00:28:11,909 --> 00:28:09,919
still in the design stages so there is

750
00:28:14,870 --> 00:28:11,919
sufficient time for us to make tweaks to

751
00:28:17,430 --> 00:28:14,880
those designs that will really optimize

752
00:28:19,350 --> 00:28:17,440
the science analyses we can do for

753
00:28:23,190 --> 00:28:19,360
plumes that are possibly erupting on

754
00:28:26,470 --> 00:28:24,470
thank you our next question comes from

755
00:28:28,389 --> 00:28:26,480
leo enright with irish television you

756
00:28:29,830 --> 00:28:28,399
may ask a question

757
00:28:32,149 --> 00:28:29,840
uh thanks very much for doing this uh

758
00:28:34,389 --> 00:28:32,159
that uh of a related question

759
00:28:37,110 --> 00:28:34,399
uh and that is when would you

760
00:28:40,230 --> 00:28:37,120
realistically expect to go back

761
00:28:42,950 --> 00:28:40,240
uh to enceladus i mean it's five or six

762
00:28:46,549 --> 00:28:42,960
years since nasa and the european space

763
00:28:50,149 --> 00:28:46,559

agency decided to prioritize a europa

764
00:28:52,710 --> 00:28:50,159
jupiter system mission uh ahead of titan

765
00:28:54,710 --> 00:28:52,720
saturn so i just wonder when might you

766
00:28:56,950 --> 00:28:54,720
reasonably expect to go back

767
00:28:59,190 --> 00:28:56,960
and do you think maybe

768
00:29:04,149 --> 00:28:59,200
the findings from this flyby might feed

769
00:29:06,149 --> 00:29:04,159
into that uh weighing of the two options

770
00:29:08,230 --> 00:29:06,159
uh that's that's a great question and

771
00:29:10,310 --> 00:29:08,240
it's one that we grapple with on a daily

772
00:29:12,470 --> 00:29:10,320
basis as the discoveries that enceladus

773
00:29:14,710 --> 00:29:12,480
just make it more and more attractive

774
00:29:16,789 --> 00:29:14,720
from a scientific point of view

775
00:29:19,510 --> 00:29:16,799
getting together a mission is is a very

776
00:29:21,990 --> 00:29:19,520
long process as you're probably aware

777
00:29:23,909 --> 00:29:22,000
so we're not revisiting priorities right

778
00:29:25,990 --> 00:29:23,919
now but i think

779
00:29:27,510 --> 00:29:26,000
but we are considering other missions

780
00:29:29,909 --> 00:29:27,520
that could follow cassini that would

781
00:29:31,590 --> 00:29:29,919
focus on enceladus but i think the the

782
00:29:33,350 --> 00:29:31,600
important thing in the near term that we

783
00:29:35,830 --> 00:29:33,360
take away from this is

784
00:29:36,630 --> 00:29:35,840
not so much which destination we go back

785
00:29:38,789 --> 00:29:36,640
to

786
00:29:40,310 --> 00:29:38,799
but how those destinations all fit

787
00:29:42,230 --> 00:29:40,320
together and understanding the solar

788
00:29:44,789 --> 00:29:42,240

system and what we can learn from one

789
00:29:49,750 --> 00:29:44,799
destination from one mission that we can

790
00:29:53,269 --> 00:29:51,029
thank you next question comes from

791
00:29:55,029 --> 00:29:53,279
stephen clark with space flight now and

792
00:29:57,830 --> 00:29:55,039
again if you have a question just press

793
00:30:02,549 --> 00:30:00,389
hi thanks stephen clark space flight now

794
00:30:05,430 --> 00:30:02,559
um most of my questions have been asked

795
00:30:08,149 --> 00:30:05,440
and answered but uh i have a couple

796
00:30:10,310 --> 00:30:08,159
first maybe for for linda can you

797
00:30:12,549 --> 00:30:10,320
describe the mood of the the science

798
00:30:13,830 --> 00:30:12,559
team since uh you know following up on

799
00:30:16,789 --> 00:30:13,840
that last question you may be getting

800
00:30:19,750 --> 00:30:16,799
your last look at enceladus uh you know

801
00:30:21,909 --> 00:30:19,760
for uh several or at least a decade or

802
00:30:23,029 --> 00:30:21,919
more uh with this flyby and the one in

803
00:30:25,830 --> 00:30:23,039
december

804
00:30:26,710 --> 00:30:25,840
and for earl uh can you just update us

805
00:30:28,549 --> 00:30:26,720
on the

806
00:30:30,710 --> 00:30:28,559
health of the cassini spacecraft after

807
00:30:32,070 --> 00:30:30,720
11 years at saturn you know two more

808
00:30:35,830 --> 00:30:32,080
years to go before the end of the

809
00:30:39,350 --> 00:30:35,840
mission uh how's it doing thanks a

810
00:30:42,149 --> 00:30:40,870
there's a feedback as far as the mood of

811
00:30:45,029 --> 00:30:42,159
the science team there's a lot of

812
00:30:47,269 --> 00:30:45,039
excitement about this particular flyby

813
00:30:48,789 --> 00:30:47,279

and also we're starting to realize as a

814
00:30:50,789 --> 00:30:48,799
group that we're getting toward the the

815
00:30:52,870 --> 00:30:50,799
end of the mission after this fly by

816
00:30:55,110 --> 00:30:52,880
just a single more flyby of enceladus a

817
00:30:57,269 --> 00:30:55,120
more distant one coming up in december

818
00:30:59,269 --> 00:30:57,279
but we're certainly all eagerly awaiting

819
00:31:02,230 --> 00:30:59,279
the scientific results from this deep

820
00:31:04,950 --> 00:31:02,240
plunge through the plume

821
00:31:06,950 --> 00:31:04,960
yeah just to pile onto that uh mood

822
00:31:09,590 --> 00:31:06,960
thing if the flight team also feels a

823
00:31:12,870 --> 00:31:09,600
certain sense of both you know maybe a

824
00:31:14,950 --> 00:31:12,880
half uh things going you know last but

825
00:31:16,389 --> 00:31:14,960
everything but the sense is mostly of

826
00:31:19,110 --> 00:31:16,399
accomplishment uh they're just

827
00:31:21,190 --> 00:31:19,120
absolutely exultant in the successes of

828
00:31:23,430 --> 00:31:21,200
this mission and putting a capstone on

829
00:31:25,029 --> 00:31:23,440
to the enceladus encounters the icy

830
00:31:27,190 --> 00:31:25,039
satellites and then often to the

831
00:31:29,750 --> 00:31:27,200
proximal orbits is just a real sense of

832
00:31:33,269 --> 00:31:29,760
exhilaration and accomplishment relative

833
00:31:35,590 --> 00:31:33,279
to spacecraft it's absolutely phenomenal

834
00:31:37,509 --> 00:31:35,600
we're running low on propellant as we

835
00:31:38,710 --> 00:31:37,519
should be towards the end of a mission

836
00:31:40,710 --> 00:31:38,720
you don't want to finish with a lot of

837
00:31:43,990 --> 00:31:40,720
gas in the tank the instruments we've

838
00:31:45,509 --> 00:31:44,000

lost one uh the plasma spectrometer but

839
00:31:48,310 --> 00:31:45,519
everything else is working well we've

840
00:31:50,789 --> 00:31:48,320
worked around some of the some of the

841
00:31:52,549 --> 00:31:50,799
bumps in the night the warranties

842
00:31:53,909 --> 00:31:52,559
expired an awful lot of components but

843
00:31:56,070 --> 00:31:53,919
they're still functioning just

844
00:31:57,990 --> 00:31:56,080
flawlessly i've got to say the ground

845
00:31:59,430 --> 00:31:58,000
and the spacecraft assets are in great

846
00:32:01,509 --> 00:31:59,440
shape and we're looking forward to

847
00:32:03,909 --> 00:32:01,519
completing everything just the way we

848
00:32:07,110 --> 00:32:05,269
okay and with that operator we're going

849
00:32:08,710 --> 00:32:07,120
to take one more call and then ladies

850
00:32:10,630 --> 00:32:08,720
and gentlemen we're going to go back to

851
00:32:14,549 --> 00:32:10,640
social media again send those questions

852
00:32:16,710 --> 00:32:14,559
in at hashtag ask nasa so um operating

853
00:32:18,149 --> 00:32:16,720
one more question than social media okay

854
00:32:20,950 --> 00:32:18,159
we have a question from lauren grush

855
00:32:23,509 --> 00:32:20,960
with the verge let me ask you a question

856
00:32:24,549 --> 00:32:23,519
hi thanks for taking my question um so i

857
00:32:26,870 --> 00:32:24,559
was wondering if we could go into a

858
00:32:29,509 --> 00:32:26,880
little more detail about how you guys

859
00:32:30,549 --> 00:32:29,519
characterize uh habitability like what

860
00:32:32,870 --> 00:32:30,559
what you

861
00:32:35,269 --> 00:32:32,880
what ingredients would make it much more

862
00:32:36,870 --> 00:32:35,279
likely to have life there than not is

863
00:32:39,590 --> 00:32:36,880

there anything in particular you're

864
00:32:41,509 --> 00:32:39,600
excited to find

865
00:32:42,549 --> 00:32:41,519
as far as the habitability question you

866
00:32:44,950 --> 00:32:42,559
want to know first of all you have

867
00:32:47,190 --> 00:32:44,960
liquid water for life like we know it on

868
00:32:48,950 --> 00:32:47,200
earth that's very key then you want to

869
00:32:51,269 --> 00:32:48,960
know if you have the right energy

870
00:32:53,430 --> 00:32:51,279
available in this case the hydrothermal

871
00:32:55,590 --> 00:32:53,440
vents are providing that source of

872
00:32:58,149 --> 00:32:55,600
energy and then also the question of

873
00:32:59,669 --> 00:32:58,159
composition do you have the right kinds

874
00:33:02,230 --> 00:32:59,679
of ingredients and we see that in the

875
00:33:04,470 --> 00:33:02,240
organic molecules we know there's carbon

876
00:33:06,149 --> 00:33:04,480
dioxide there as well

877
00:33:08,470 --> 00:33:06,159
we've also been able to measure that we

878
00:33:10,710 --> 00:33:08,480
have a salty ocean it's slightly salty

879
00:33:12,230 --> 00:33:10,720
and so that also is similar to the

880
00:33:14,470 --> 00:33:12,240
earth's ocean

881
00:33:16,950 --> 00:33:14,480
we think that the the ph of the ocean

882
00:33:19,110 --> 00:33:16,960
falls in an intermediate range maybe of

883
00:33:21,350 --> 00:33:19,120
9 to 12 so again

884
00:33:23,990 --> 00:33:21,360
a favorable kind of condition for life

885
00:33:25,269 --> 00:33:24,000
so we are basically taking these pieces

886
00:33:26,789 --> 00:33:25,279
of the puzzle

887
00:33:29,430 --> 00:33:26,799
that we get back from the the

888
00:33:31,830 --> 00:33:29,440

composition and the energy putting them

889
00:33:34,310 --> 00:33:31,840
together to form this picture

890
00:33:37,509 --> 00:33:34,320
of a potentially habitable ocean on

891
00:33:40,950 --> 00:33:39,190
so this is dwayne brown for media we're

892
00:33:42,710 --> 00:33:40,960
going to uh come back to you in a few

893
00:33:45,269 --> 00:33:42,720
minutes we're going to take a few more

894
00:33:47,990 --> 00:33:45,279
social media and then we'll wrap up with

895
00:33:49,750 --> 00:33:48,000
any more media calls so uh again we'll

896
00:33:51,110 --> 00:33:49,760
go back to jason townsend on social

897
00:33:52,630 --> 00:33:51,120
media jason

898
00:33:54,630 --> 00:33:52,640
sure this first question comes from you

899
00:33:56,630 --> 00:33:54,640
stream one of our viewers there asked

900
00:34:01,590 --> 00:33:56,640
luke asks uh how long have you been

901
00:34:05,830 --> 00:34:03,269
girl do you want to hear

902
00:34:08,149 --> 00:34:05,840
this we've we planned this flyby five

903
00:34:09,829 --> 00:34:08,159
years ago we have the entire

904
00:34:12,310 --> 00:34:09,839
seven last seven years the mission

905
00:34:13,510 --> 00:34:12,320
choreographed back when we began and got

906
00:34:15,190 --> 00:34:13,520
approval for what we're calling the

907
00:34:17,349 --> 00:34:15,200
solstice mission so this has been on the

908
00:34:19,349 --> 00:34:17,359
books for a long time yeah i can add to

909
00:34:23,270 --> 00:34:19,359
that that since the discovery of the

910
00:34:26,069 --> 00:34:23,280
enceladus plume in 2005 we've basically

911
00:34:28,550 --> 00:34:26,079
refocused our cassini tour to try and

912
00:34:31,190 --> 00:34:28,560
include as many flybys of enceladus as

913
00:34:34,950 --> 00:34:31,200

we can and so by our final flyby we'll

914
00:34:36,790 --> 00:34:34,960
have had 22 close flybys to enceladus

915
00:34:38,950 --> 00:34:36,800
and other opportunities to study in

916
00:34:41,829 --> 00:34:38,960
particular the the plume itself

917
00:34:43,349 --> 00:34:41,839
at a greater distance

918
00:34:45,349 --> 00:34:43,359
great next question comes from twitter

919
00:34:47,270 --> 00:34:45,359
user cameron who asked besides

920
00:34:51,109 --> 00:34:47,280
spectrometer data what other data will

921
00:34:55,270 --> 00:34:52,869
well besides spectrometer data we'll

922
00:34:57,589 --> 00:34:55,280
also be collecting images

923
00:34:59,030 --> 00:34:57,599
inbound looking at enceladus and in

924
00:35:01,109 --> 00:34:59,040
closest approach

925
00:35:03,109 --> 00:35:01,119
basically dragging the frame across for

926
00:35:05,589 --> 00:35:03,119
the narrow and wide angle camera then

927
00:35:07,910 --> 00:35:05,599
more images of the plume backlit as we

928
00:35:10,870 --> 00:35:07,920
go outbound and at the same time as the

929
00:35:13,030 --> 00:35:10,880
images will also be getting data in

930
00:35:15,109 --> 00:35:13,040
other wavelengths from the ultraviolet

931
00:35:16,470 --> 00:35:15,119
through the near-infrared and into the

932
00:35:18,470 --> 00:35:16,480
far infrared

933
00:35:19,910 --> 00:35:18,480
as well as both the gas and the plume

934
00:35:21,270 --> 00:35:19,920
data also

935
00:35:23,349 --> 00:35:21,280
we get

936
00:35:25,670 --> 00:35:23,359
measurements of the local environment in

937
00:35:27,670 --> 00:35:25,680
situ not just of the gas and particles

938
00:35:29,750 --> 00:35:27,680

but we'll be looking at the plasma as we

939
00:35:32,790 --> 00:35:29,760
come in and go out from enceladus so

940
00:35:35,270 --> 00:35:32,800
we'll really be using our entire suite

941
00:35:38,950 --> 00:35:35,280
of cassini instruments as we fly through

942
00:35:43,109 --> 00:35:40,390
next question comes from twitter user

943
00:35:45,109 --> 00:35:43,119
scott who asks how close to dangerous is

944
00:35:48,150 --> 00:35:45,119
the altitude of this path and were you

945
00:35:50,710 --> 00:35:48,160
tempted to go lower

946
00:35:51,829 --> 00:35:50,720
i can help you we were tempted to go

947
00:35:56,470 --> 00:35:51,839
lower

948
00:35:58,630 --> 00:35:56,480
more safe as and still felt like we were

949
00:36:02,870 --> 00:35:58,640
safe but there were a couple of of

950
00:36:04,790 --> 00:36:02,880
trades that we made that that chose um

951
00:36:06,470 --> 00:36:04,800
made us decide not to i'll speak to the

952
00:36:08,150 --> 00:36:06,480
one engineering trade and then they can

953
00:36:11,030 --> 00:36:08,160
speak to the science trades

954
00:36:13,349 --> 00:36:11,040
it would have cost us some more fuel

955
00:36:14,950 --> 00:36:13,359
and we really felt that that fuel could

956
00:36:17,030 --> 00:36:14,960
have been better used in other parts of

957
00:36:18,710 --> 00:36:17,040
the mission so that's the engineering

958
00:36:20,710 --> 00:36:18,720
part of it it would have been safe to go

959
00:36:22,710 --> 00:36:20,720
lower but there were also some science

960
00:36:25,430 --> 00:36:22,720
components to that as well did

961
00:36:27,349 --> 00:36:25,440
yeah as you go lower it just also makes

962
00:36:29,510 --> 00:36:27,359
the flyby that much shorter as you go

963
00:36:31,829 --> 00:36:29,520

whizzing through the plume so standing

964
00:36:33,670 --> 00:36:31,839
up just a little bit more gives us a a

965
00:36:35,910 --> 00:36:33,680
few more tens of seconds to look at the

966
00:36:38,470 --> 00:36:35,920
data itself and then the scientists

967
00:36:41,589 --> 00:36:38,480
themselves also thought that using that

968
00:36:43,510 --> 00:36:41,599
extra fuel to get to a very exciting set

969
00:36:45,750 --> 00:36:43,520
of proximal orbits at the end of the

970
00:36:47,510 --> 00:36:45,760
mission was definitely the right trait

971
00:36:50,550 --> 00:36:47,520
to make we want to definitely get

972
00:36:52,069 --> 00:36:50,560
through to those orbits

973
00:36:54,710 --> 00:36:52,079
next question comes from twitter user

974
00:36:56,950 --> 00:36:54,720
jason who asks how long could enceladus

975
00:37:00,870 --> 00:36:56,960
oceans continue to spray out in space

976
00:37:02,950 --> 00:37:00,880
will it ever quote unquote run out

977
00:37:05,030 --> 00:37:02,960
that's a very good question that's a

978
00:37:07,270 --> 00:37:05,040
very good question indeed it's possible

979
00:37:08,870 --> 00:37:07,280
that that ocean might have been there

980
00:37:10,470 --> 00:37:08,880
since the time and solidus formed we

981
00:37:12,870 --> 00:37:10,480
don't know for sure the fact that it's a

982
00:37:15,589 --> 00:37:12,880
global ocean leads us to think in that

983
00:37:17,589 --> 00:37:15,599
direction uh the the mass that it's

984
00:37:19,990 --> 00:37:17,599
losing per day

985
00:37:22,470 --> 00:37:20,000
tells us that that those plumes and jets

986
00:37:24,790 --> 00:37:22,480
could continue to erupt for a very very

987
00:37:26,470 --> 00:37:24,800
very long time so i haven't made an

988
00:37:28,390 --> 00:37:26,480

estimate of that given the total volume

989
00:37:30,470 --> 00:37:28,400
of the ocean but certainly don't have to

990
00:37:32,950 --> 00:37:30,480
worry about in our lifetime or any

991
00:37:36,550 --> 00:37:32,960
anytime soon that the the plume might

992
00:37:39,670 --> 00:37:37,750
all right next question comes from

993
00:37:41,990 --> 00:37:39,680
twitter user tom who asks after the

994
00:37:44,630 --> 00:37:42,000
flyby could there be a possibility of a

995
00:37:48,470 --> 00:37:44,640
surface sample mission to find out how

996
00:37:50,950 --> 00:37:48,480
enceladus oceans in the years to come

997
00:37:53,910 --> 00:37:50,960
we uh we actually studied that

998
00:37:56,230 --> 00:37:53,920
a few years ago or about eight years ago

999
00:37:58,630 --> 00:37:56,240
after we first saw the plumes

1000
00:38:00,790 --> 00:37:58,640
and it's a very intriguing possibility

1001
00:38:02,630 --> 00:38:00,800
it's a very difficult mission to pull

1002
00:38:04,310 --> 00:38:02,640
off if you've ever looked at the highest

1003
00:38:06,310 --> 00:38:04,320
resolution pictures of the surface of

1004
00:38:09,349 --> 00:38:06,320
enceladus and we'll be getting some more

1005
00:38:12,310 --> 00:38:09,359
back soon it's a very rough place to

1006
00:38:13,510 --> 00:38:12,320
land a very difficult place to land

1007
00:38:15,589 --> 00:38:13,520
but the

1008
00:38:19,349 --> 00:38:15,599
joy of enceladus is that you don't need

1009
00:38:21,349 --> 00:38:19,359
to land it is spewing samples into space

1010
00:38:23,750 --> 00:38:21,359
so if you can just fly by the right

1011
00:38:28,710 --> 00:38:23,760
trajectory at the right velocity you can

1012
00:38:32,790 --> 00:38:30,550
uh next question comes from twitter user

1013
00:38:35,109 --> 00:38:32,800

mac who asks will there be enough info

1014
00:38:37,109 --> 00:38:35,119
gathered for exobiologists to do a

1015
00:38:39,910 --> 00:38:37,119
microcosm lab experiment on the

1016
00:38:42,710 --> 00:38:39,920
potential for life

1017
00:38:44,710 --> 00:38:42,720
uh no there won't

1018
00:38:46,710 --> 00:38:44,720
in fact we were discussing sample size

1019
00:38:49,270 --> 00:38:46,720
just the other day and somebody passed

1020
00:38:50,710 --> 00:38:49,280
around a small vial that indicated how

1021
00:38:52,230 --> 00:38:50,720
much actual

1022
00:38:55,190 --> 00:38:52,240
the amount of water you would actually

1023
00:38:56,790 --> 00:38:55,200
get in a sample from a cassini flyby and

1024
00:38:58,390 --> 00:38:56,800
it's it's literally

1025
00:39:00,150 --> 00:38:58,400
a small drop

1026
00:39:02,470 --> 00:39:00,160
but that's how sensitive our instruments

1027
00:39:04,710 --> 00:39:02,480
are with just a very tiny drop of water

1028
00:39:07,589 --> 00:39:04,720
we can deduce a lot of things about the

1029
00:39:11,349 --> 00:39:09,190
last question here for this round the

1030
00:39:13,750 --> 00:39:11,359
social questions uh from alice on

1031
00:39:15,670 --> 00:39:13,760
twitter who asks how long will it be

1032
00:39:18,950 --> 00:39:15,680
until we get reports back on what was

1033
00:39:23,190 --> 00:39:21,430
linda you want to start yeah for the

1034
00:39:24,310 --> 00:39:23,200
pictures we'll probably get this earl

1035
00:39:26,390 --> 00:39:24,320
mentioned

1036
00:39:28,550 --> 00:39:26,400
perhaps thursday night more likely

1037
00:39:30,630 --> 00:39:28,560
friday morning by the time we try and

1038
00:39:33,030 --> 00:39:30,640

process out some of the smear

1039
00:39:35,349 --> 00:39:33,040
for the spectrometers for the particles

1040
00:39:37,910 --> 00:39:35,359
and gas there'll be a first quick look

1041
00:39:40,230 --> 00:39:37,920
within about a week but then it may take

1042
00:39:42,550 --> 00:39:40,240
several more weeks to do the more

1043
00:39:45,829 --> 00:39:42,560
complete and thorough analysis uh on

1044
00:39:49,190 --> 00:39:47,109
all right we'll continue on with social

1045
00:39:51,430 --> 00:39:49,200
questions here this next one comes from

1046
00:39:53,190 --> 00:39:51,440
twitter user cosmic who asks if this

1047
00:39:59,030 --> 00:39:53,200
turned out to be a perfect mission what

1048
00:40:03,190 --> 00:40:00,950
for a perfect flyby i think if we just

1049
00:40:04,950 --> 00:40:03,200
get the data back safely to the ground

1050
00:40:06,870 --> 00:40:04,960
and make some new

1051
00:40:09,190 --> 00:40:06,880
new findings about what material might

1052
00:40:11,030 --> 00:40:09,200
be there and and put those pieces then

1053
00:40:13,510 --> 00:40:11,040
together to tell us about what's going

1054
00:40:15,750 --> 00:40:13,520
on in enceladus

1055
00:40:18,069 --> 00:40:15,760
and i i would say that cassini has

1056
00:40:21,670 --> 00:40:18,079
already been a perfect mission it has

1057
00:40:23,750 --> 00:40:21,680
completely exceeded our expectations

1058
00:40:25,910 --> 00:40:23,760
and when you factor in what we have left

1059
00:40:30,470 --> 00:40:25,920
to come in the next two years it's going

1060
00:40:35,190 --> 00:40:32,310
all right last question here from anshul

1061
00:40:37,910 --> 00:40:35,200
who asks cassini and is in life is

1062
00:40:40,710 --> 00:40:37,920
expected to be in 2017 what more is

1063
00:40:41,829 --> 00:40:40,720

cassini up to

1064
00:40:44,150 --> 00:40:41,839
yeah

1065
00:40:47,030 --> 00:40:44,160
cassini has a lot more in store we have

1066
00:40:49,510 --> 00:40:47,040
our final enceladus flyby in december

1067
00:40:51,430 --> 00:40:49,520
and then we're starting the climb to our

1068
00:40:53,430 --> 00:40:51,440
final set of orbits

1069
00:40:55,910 --> 00:40:53,440
first we'll pull in our periapse our

1070
00:40:58,550 --> 00:40:55,920
closest approach of it each orbit in

1071
00:41:01,030 --> 00:40:58,560
very close to saturn's f ring and get

1072
00:41:04,069 --> 00:41:01,040
some very detailed high resolution views

1073
00:41:06,550 --> 00:41:04,079
of those outermost rings of saturn we'll

1074
00:41:08,790 --> 00:41:06,560
also get a chance to fly very close to

1075
00:41:10,790 --> 00:41:08,800
some of these tiny ring moons

1076
00:41:13,270 --> 00:41:10,800
that are basically some of them potato

1077
00:41:15,030 --> 00:41:13,280
shaped very oddly shaped and to study

1078
00:41:18,630 --> 00:41:15,040
those in more detail

1079
00:41:21,109 --> 00:41:18,640
and then in april 2017 we actually

1080
00:41:25,030 --> 00:41:21,119
hop across the entire ring system of

1081
00:41:27,829 --> 00:41:25,040
saturn and spend 22 orbits inside of a

1082
00:41:30,309 --> 00:41:27,839
2000 kilometer wide gap between the

1083
00:41:32,870 --> 00:41:30,319
innermost ring and the top of saturn's

1084
00:41:35,510 --> 00:41:32,880
atmosphere and here's a chance to have a

1085
00:41:37,349 --> 00:41:35,520
brand new mission for cassini we'll look

1086
00:41:39,670 --> 00:41:37,359
at the planet's gravity and magnetic

1087
00:41:41,430 --> 00:41:39,680
fields in exquisite detail

1088
00:41:42,950 --> 00:41:41,440

measure the mass of the rings for the

1089
00:41:44,550 --> 00:41:42,960
very first time

1090
00:41:47,190 --> 00:41:44,560
get in-situ measurements that will

1091
00:41:49,589 --> 00:41:47,200
directly measure the composition of the

1092
00:41:51,510 --> 00:41:49,599
ring particles as well as tell us about

1093
00:41:54,550 --> 00:41:51,520
the composition of saturn's upper

1094
00:41:56,630 --> 00:41:54,560
atmosphere so it will be an incredible

1095
00:41:59,510 --> 00:41:56,640
end for the cassini mission

1096
00:42:01,349 --> 00:41:59,520
then on our final orbit will cassini

1097
00:42:05,190 --> 00:42:01,359
will go out in what i call a blaze of

1098
00:42:07,270 --> 00:42:05,200
glory as we go into saturn's atmosphere

1099
00:42:09,270 --> 00:42:07,280
on that very last orbit and at that

1100
00:42:10,790 --> 00:42:09,280
point cassini the spacecraft itself will

1101
00:42:12,790 --> 00:42:10,800
be vaporized

1102
00:42:15,990 --> 00:42:12,800
and you can imagine all of the molecules

1103
00:42:19,829 --> 00:42:16,000
of cassini now spread across and being

1104
00:42:23,829 --> 00:42:21,750
excellent thank you all okay folks well

1105
00:42:25,109 --> 00:42:23,839
we're going to wrap up actually early

1106
00:42:26,790 --> 00:42:25,119
and that's a

1107
00:42:28,630 --> 00:42:26,800
testament to a great team great

1108
00:42:31,829 --> 00:42:28,640
presentations great questions i want to

1109
00:42:34,710 --> 00:42:31,839
thank curt earl linda and the entire

1110
00:42:36,870 --> 00:42:34,720
cassini team as as kurt said it's

1111
00:42:38,550 --> 00:42:36,880
already been perfect mission and it's

1112
00:42:40,470 --> 00:42:38,560
still going and ladies and gentlemen

1113
00:42:42,950 --> 00:42:40,480

stay tuned for

1114
00:42:45,270 --> 00:42:42,960
what we will post following wednesday

1115
00:42:46,589 --> 00:42:45,280
october 28th event

1116
00:42:50,190 --> 00:42:46,599
watch

1117
00:42:52,470 --> 00:42:50,200
www.nasa.gov cassini again

1118
00:42:55,349 --> 00:42:52,480
www.nasa.gov cassini for the latest

1119
00:42:58,069 --> 00:42:55,359
updates images and let's see what

1120
00:43:00,710 --> 00:42:58,079
surprises we will get down the road and

1121
00:43:01,510 --> 00:43:00,720
with that uh operator please close us

1122
00:43:02,870 --> 00:43:01,520
out

1123
00:43:04,150 --> 00:43:02,880
thank you that does conclude today's

1124
00:43:05,829 --> 00:43:04,160
conference we thank you for your