
JPL
18
20
21
NASA
National Aeronautics and Space Administration
Jet Propulsion Laboratory
California Institute of Technology

1
00:00:09,830 --> 00:00:07,030
good morning from nasa's jet propulsion

2
00:00:11,669 --> 00:00:09,840
laboratory in pasadena california i'm

3
00:00:15,430 --> 00:00:11,679
jane platt with the media relations

4
00:00:18,310 --> 00:00:15,440
office and our topic today is ldsd

5
00:00:20,550 --> 00:00:18,320
low density supersonic decelerator or as

6
00:00:21,750 --> 00:00:20,560
some people like to call it the flying

7
00:00:27,269 --> 00:00:21,760
saucer

8
00:00:28,870 --> 00:00:27,279
was tested on june 28th in hawaii on the

9
00:00:31,109 --> 00:00:28,880
island of kauai

10
00:00:32,870 --> 00:00:31,119
and the team has had some time to

11
00:00:34,389 --> 00:00:32,880
analyze the data they're going to share

12
00:00:36,630 --> 00:00:34,399
with us today some

13
00:00:39,270 --> 00:00:36,640

preliminary results and they also have

14
00:00:40,950 --> 00:00:39,280
some pretty cool high definition

15
00:00:43,110 --> 00:00:40,960
video to show us

16
00:00:45,270 --> 00:00:43,120
i'm going to start out by introducing

17
00:00:48,229 --> 00:00:45,280
our panelists we have from nasa

18
00:00:50,709 --> 00:00:48,239
headquarters jeff sheehai and he is the

19
00:00:53,750 --> 00:00:50,719
senior technologist with the space

20
00:00:56,790 --> 00:00:53,760
technology mission

21
00:01:01,590 --> 00:00:56,800
we also have mark adler from jpl and he

22
00:01:07,350 --> 00:01:04,310
also from jpl ian clark who is the

23
00:01:08,710 --> 00:01:07,360
principal investigator for ldsd

24
00:01:12,870 --> 00:01:08,720
we're going to start things off with

25
00:01:16,390 --> 00:01:14,310
technical officer of the space

26
00:01:18,630 --> 00:01:16,400
technology mission directorate i'm

27
00:01:20,469 --> 00:01:18,640
pinchating for my boss dr mike gazarick

28
00:01:22,789 --> 00:01:20,479
who wanted to be here today but had

29
00:01:24,230 --> 00:01:22,799
another issue come up and so he sent me

30
00:01:25,749 --> 00:01:24,240
out here and i'm really

31
00:01:28,550 --> 00:01:25,759
proud and pleased to be sharing the

32
00:01:29,830 --> 00:01:28,560
stage with mark and ian here

33
00:01:32,230 --> 00:01:29,840
you know it's been a heck of a summer

34
00:01:33,910 --> 00:01:32,240
for space technology it's been a heck of

35
00:01:35,109 --> 00:01:33,920
a summer for these guys

36
00:01:37,910 --> 00:01:35,119
and

37
00:01:40,710 --> 00:01:37,920
the flight tests that they conducted

38
00:01:42,630 --> 00:01:40,720

the the successful demonstration of the

39
00:01:45,030 --> 00:01:42,640
low-density supersonic decelerator

40
00:01:48,389 --> 00:01:45,040
technologies has been a centerpiece

41
00:01:51,109 --> 00:01:48,399
of a technology campaign that the agency

42
00:01:53,590 --> 00:01:51,119
has has in progress this summer

43
00:01:55,990 --> 00:01:53,600
a lot of highlights of different

44
00:01:57,749 --> 00:01:56,000
technology activities in the agency

45
00:01:59,990 --> 00:01:57,759
including those of space technology

46
00:02:02,789 --> 00:02:00,000
mission directorate you can see all that

47
00:02:05,590 --> 00:02:02,799
stuff at the nasa website but

48
00:02:08,070 --> 00:02:05,600
we've been testing the largest composite

49
00:02:10,389 --> 00:02:08,080
cryogenic propellant tank ever built

50
00:02:12,070 --> 00:02:10,399
that was built by boeing and it's being

51
00:02:14,630 --> 00:02:12,080
tested at marshall space flight center

52
00:02:17,589 --> 00:02:14,640
we've been testing thrusters for a new

53
00:02:19,589 --> 00:02:17,599
green propellant propulsion system built

54
00:02:21,430 --> 00:02:19,599
by aerojet and going to fly on a

55
00:02:23,510 --> 00:02:21,440
demonstration

56
00:02:26,550 --> 00:02:23,520
led by ball aerospace

57
00:02:29,030 --> 00:02:26,560
that will fly in early 2016. we've done

58
00:02:31,750 --> 00:02:29,040
overwhelmingly successful tests of some

59
00:02:33,509 --> 00:02:31,760
high-power solar arrays that will be

60
00:02:36,150 --> 00:02:33,519
used in solar electric propulsion

61
00:02:38,470 --> 00:02:36,160
systems for asteroid retrieval missions

62
00:02:40,869 --> 00:02:38,480
and cargo missions to mars so a lot of

63
00:02:43,350 --> 00:02:40,879

the focus of the agency as you can see

64
00:02:45,430 --> 00:02:43,360
from the graphic is

65
00:02:46,309 --> 00:02:45,440
developing technologies

66
00:02:51,190 --> 00:02:46,319
to

67
00:02:53,589 --> 00:02:51,200
facilitate human exploration of mars the

68
00:02:56,150 --> 00:02:53,599
technology pathway to mars it really

69
00:02:57,750 --> 00:02:56,160
boils down to you got to get there

70
00:02:59,270 --> 00:02:57,760
you got to land there

71
00:03:00,949 --> 00:02:59,280
you got to live there

72
00:03:01,750 --> 00:03:00,959
and you probably want to return from

73
00:03:04,470 --> 00:03:01,760
there

74
00:03:05,990 --> 00:03:04,480
and so these technologies that mark and

75
00:03:08,309 --> 00:03:06,000
ian have been working on are all about

76
00:03:11,350 --> 00:03:08,319
landing on mars landing on mars is

77
00:03:14,630 --> 00:03:11,360
really hard just about two years ago

78
00:03:17,350 --> 00:03:14,640
the agency and a team from jpl landed

79
00:03:19,190 --> 00:03:17,360
the curiosity rover on mars and

80
00:03:22,070 --> 00:03:19,200
maybe many remember watching that and

81
00:03:23,750 --> 00:03:22,080
seeing the drama the dramatic entry of

82
00:03:26,070 --> 00:03:23,760
that and descent through the martian

83
00:03:28,390 --> 00:03:26,080
atmosphere and landing on mars with a

84
00:03:30,470 --> 00:03:28,400
very complicated

85
00:03:32,470 --> 00:03:30,480
series of mechanisms to get that rover

86
00:03:34,149 --> 00:03:32,480
safely on the surface of mars

87
00:03:36,630 --> 00:03:34,159
this flight test also had a very

88
00:03:38,470 --> 00:03:36,640

complicated series of mechanisms to get

89
00:03:40,630 --> 00:03:38,480
the vehicle to the right flight test

90
00:03:42,229 --> 00:03:40,640
conditions and mark and ian will tell

91
00:03:43,910 --> 00:03:42,239
you all about that

92
00:03:46,309 --> 00:03:43,920
so we're creating

93
00:03:48,470 --> 00:03:46,319
new knowledge we're developing new

94
00:03:50,630 --> 00:03:48,480
capabilities we're demonstrating new

95
00:03:52,070 --> 00:03:50,640
technologies that's what we're all about

96
00:03:54,390 --> 00:03:52,080
in the space technology mission

97
00:03:56,789 --> 00:03:54,400
directorate at nasa

98
00:03:59,270 --> 00:03:56,799
and this project has been doing all of

99
00:04:01,750 --> 00:03:59,280
those things in a very big way and

100
00:04:03,990 --> 00:04:01,760
you'll see that as these guys talk so

101
00:04:06,309 --> 00:04:04,000
again i'm just glad to be here glad to

102
00:04:07,910 --> 00:04:06,319
be sitting next to these guys i first

103
00:04:09,429 --> 00:04:07,920
met these guys about

104
00:04:11,429 --> 00:04:09,439
four years ago when they were just

105
00:04:13,589 --> 00:04:11,439
starting out on this project and i

106
00:04:16,550 --> 00:04:13,599
remember going into a review at

107
00:04:18,550 --> 00:04:16,560
jpl dressed about like this i think and

108
00:04:20,629 --> 00:04:18,560
everyone else was dressed about like

109
00:04:23,110 --> 00:04:20,639
that i think and

110
00:04:25,430 --> 00:04:23,120
and i remember thinking yeah jpl's kind

111
00:04:27,030 --> 00:04:25,440
of a different sort of nasa center

112
00:04:28,550 --> 00:04:27,040
but jpl is a nasa center that really

113
00:04:31,110 --> 00:04:28,560

gets things done and you'll see that

114
00:04:33,350 --> 00:04:31,120
today so thank you for coming i'm going

115
00:04:35,590 --> 00:04:33,360
to turn it over to mark here but i

116
00:04:37,510 --> 00:04:35,600
really appreciate everyone being here

117
00:04:39,909 --> 00:04:37,520
i'm excited to see some of the results

118
00:04:42,550 --> 00:04:39,919
that these guys have gleaned from this

119
00:04:44,150 --> 00:04:42,560
really successful flight tests thank you

120
00:04:45,110 --> 00:04:44,160
all right thanks jeff so good morning

121
00:04:46,469 --> 00:04:45,120
we're going to talk about what we did

122
00:04:47,670 --> 00:04:46,479
this summer we're going to show you some

123
00:04:48,629 --> 00:04:47,680
home movies

124
00:04:50,629 --> 00:04:48,639
the

125
00:04:51,909 --> 00:04:50,639
we're really happy we have tons and tons

126
00:04:53,510 --> 00:04:51,919
of data as jane said we've been

127
00:04:55,270 --> 00:04:53,520
analyzing the data nothing makes us

128
00:04:56,310 --> 00:04:55,280
happier than data

129
00:04:57,909 --> 00:04:56,320
and a lot of our data we're going to

130
00:04:59,590 --> 00:04:57,919
show you is in the form of videos if a

131
00:05:01,670 --> 00:04:59,600
picture is worth a thousand words then a

132
00:05:03,110 --> 00:05:01,680
video is worth about a million um and so

133
00:05:04,150 --> 00:05:03,120
these are incredible incredible data

134
00:05:05,590 --> 00:05:04,160
that you're going to see and it's really

135
00:05:07,350 --> 00:05:05,600
giving us great insights and is going to

136
00:05:08,790 --> 00:05:07,360
talk more about those insights so let's

137
00:05:10,950 --> 00:05:08,800
start with some videos of what happened

138
00:05:12,150 --> 00:05:10,960

on the mission

139
00:05:14,310 --> 00:05:12,160
the uh

140
00:05:15,350 --> 00:05:14,320
this is the night before on june 27th we

141
00:05:17,189 --> 00:05:15,360
had to come out the night before to get

142
00:05:19,029 --> 00:05:17,199
the vehicle set up uh bring it up on the

143
00:05:20,550 --> 00:05:19,039
tower here it is being hoisted up on the

144
00:05:22,629 --> 00:05:20,560
launch tower this tower is used for the

145
00:05:24,070 --> 00:05:22,639
balloon to pull the vehicle off the next

146
00:05:25,909 --> 00:05:24,080
morning we are inflating the balloon

147
00:05:28,070 --> 00:05:25,919
with the helium this is a 34 million

148
00:05:31,110 --> 00:05:28,080
cubic foot balloon that's able to carry

149
00:05:32,550 --> 00:05:31,120
a 7 000 pound payload to 120 000 feet

150
00:05:34,469 --> 00:05:32,560
there the balloon the tip end of the

151
00:05:35,909 --> 00:05:34,479
balloon is about filled with helium and

152
00:05:37,189 --> 00:05:35,919
that's just held in that tip end but

153
00:05:38,469 --> 00:05:37,199
when the balloon fills up at altitude

154
00:05:40,710 --> 00:05:38,479
then you'll see it's it's quite a bit

155
00:05:44,469 --> 00:05:40,720
larger go to the next video

156
00:05:44,479 --> 00:05:52,790
we're just waiting for the video here

157
00:05:52,800 --> 00:05:55,830
please stand by

158
00:05:58,550 --> 00:05:57,189
so now the balloon is being released

159
00:06:00,710 --> 00:05:58,560
from the spool

160
00:06:02,309 --> 00:06:00,720
and we have the balloon going up it's uh

161
00:06:04,469 --> 00:06:02,319
the balloon actually extends all the way

162
00:06:06,629 --> 00:06:04,479
down to that middle orange thing that's

163
00:06:08,309 --> 00:06:06,639

the parachute the vehicle comes off the

164
00:06:10,230 --> 00:06:08,319
tower it's now being hoisted entirely by

165
00:06:12,309 --> 00:06:10,240
the balloon it's going up at about 1100

166
00:06:13,909 --> 00:06:12,319
1200 feet per minute up into the sky

167
00:06:15,670 --> 00:06:13,919
going very quickly there's an infrared

168
00:06:16,710 --> 00:06:15,680
view of the of the payload going up on

169
00:06:18,710 --> 00:06:16,720
the balloon

170
00:06:20,309 --> 00:06:18,720
here it's a time lapse video showing the

171
00:06:21,670 --> 00:06:20,319
balloon expanding as it goes higher and

172
00:06:22,950 --> 00:06:21,680
higher in altitude the balloon expands

173
00:06:24,309 --> 00:06:22,960
to larger and larger size until it

174
00:06:26,550 --> 00:06:24,319
finally gets to this full size that you

175
00:06:28,550 --> 00:06:26,560
see right here at 34 million cubic feet

176
00:06:29,749 --> 00:06:28,560
up at full altitude

177
00:06:31,189 --> 00:06:29,759
all right next video so once we got to

178
00:06:33,110 --> 00:06:31,199
altitude got to float about two hours

179
00:06:35,110 --> 00:06:33,120
later we then dropped the vehicle from

180
00:06:37,110 --> 00:06:35,120
the balloon here you see the vehicle

181
00:06:38,790 --> 00:06:37,120
come drop off and the first thing we'll

182
00:06:40,070 --> 00:06:38,800
do is fire up those two spin motors you

183
00:06:42,629 --> 00:06:40,080
see right there to spin it up to about

184
00:06:44,790 --> 00:06:42,639
50 rpm then this large solid rocket

185
00:06:47,029 --> 00:06:44,800
motor fires a star 48 motor it fired for

186
00:06:50,309 --> 00:06:47,039
71 seconds to accelerate the vehicle

187
00:06:51,990 --> 00:06:50,319
from zero to mach 4 mach 4.3 actually in

188
00:06:53,430 --> 00:06:52,000

that 71 seconds

189
00:06:54,870 --> 00:06:53,440
then we fire the spin down motors i

190
00:06:56,790 --> 00:06:54,880
think comes to a dead stop and then

191
00:06:58,870 --> 00:06:56,800
flies very stably at mach 4 so we're

192
00:07:00,469 --> 00:06:58,880
very happy about this at this point

193
00:07:01,749 --> 00:07:00,479
we've actually achieved most of the

194
00:07:03,749 --> 00:07:01,759
objectives of the flight that we had

195
00:07:04,870 --> 00:07:03,759
this summer our our main objective was

196
00:07:06,070 --> 00:07:04,880
to show that we could get this vehicle

197
00:07:07,510 --> 00:07:06,080
to altitude that we get it to the

198
00:07:08,790 --> 00:07:07,520
conditions that it will that the

199
00:07:11,029 --> 00:07:08,800
technologies will see when they actually

200
00:07:12,309 --> 00:07:11,039
fly at mars so we had to get up to 190

201
00:07:15,430 --> 00:07:12,319
000 feet which is where this test

202
00:07:16,629 --> 00:07:15,440
vehicle ended up at mach 4.3 and 190 000

203
00:07:18,230 --> 00:07:16,639
feet we have about the density of the

204
00:07:19,749 --> 00:07:18,240
martian atmosphere so that allows us to

205
00:07:21,029 --> 00:07:19,759
test the vehicle at the right density

206
00:07:23,029 --> 00:07:21,039
test the technologies at the right

207
00:07:24,550 --> 00:07:23,039
density and test them at the right mach

208
00:07:25,909 --> 00:07:24,560
number and so now ian's going to talk

209
00:07:27,670 --> 00:07:25,919
about the test that we actually did so

210
00:07:29,189 --> 00:07:27,680
we had we had a great flight and we

211
00:07:30,790 --> 00:07:29,199
showed the vehicle do what can do now

212
00:07:31,990 --> 00:07:30,800
ian's going to talk about what we got

213
00:07:33,909 --> 00:07:32,000

out of the out of the information from

214
00:07:35,510 --> 00:07:33,919
the from the technology demos

215
00:07:37,270 --> 00:07:35,520
so as mark mentioned the vehicle did an

216
00:07:39,830 --> 00:07:37,280
amazing job of getting us to the right

217
00:07:41,430 --> 00:07:39,840
speed and altitude uh test conditions

218
00:07:43,270 --> 00:07:41,440
that would be analogous to the

219
00:07:45,749 --> 00:07:43,280
conditions these technologies would see

220
00:07:46,869 --> 00:07:45,759
as they would one day be used on mars

221
00:07:48,390 --> 00:07:46,879
we've been developing a number of

222
00:07:50,629 --> 00:07:48,400
technologies as part of this project

223
00:07:52,230 --> 00:07:50,639
technologies that will enable us to land

224
00:07:54,469 --> 00:07:52,240
payloads significantly larger than the

225
00:07:55,830 --> 00:07:54,479
curiosity rover land them the places on

226
00:07:58,390 --> 00:07:55,840
mars that we've never been able to get

227
00:08:00,230 --> 00:07:58,400
to before and land them more accurately

228
00:08:01,670 --> 00:08:00,240
the first of these technologies is

229
00:08:03,990 --> 00:08:01,680
something we call a supersonic

230
00:08:06,070 --> 00:08:04,000
inflatable aerodynamic decelerator or

231
00:08:08,150 --> 00:08:06,080
sciad for short and so let's just go

232
00:08:09,189 --> 00:08:08,160
straight to video one

233
00:08:10,710 --> 00:08:09,199
of that

234
00:08:12,390 --> 00:08:10,720
so the first video you see here is the

235
00:08:15,430 --> 00:08:12,400
camera lens deploying and this is

236
00:08:17,110 --> 00:08:15,440
real-time uh video of the side inflating

237
00:08:18,710 --> 00:08:17,120
very quickly and in a fraction of a

238
00:08:20,469 --> 00:08:18,720

second i think we'll have another view

239
00:08:22,309 --> 00:08:20,479
here in just a moment

240
00:08:24,309 --> 00:08:22,319
the side goes from a very tightly packed

241
00:08:26,869 --> 00:08:24,319
stowed configuration to a fully deployed

242
00:08:29,029 --> 00:08:26,879
configuration in about 0.3 seconds

243
00:08:30,710 --> 00:08:29,039
we even have a high-speed panoramic

244
00:08:32,870 --> 00:08:30,720
selfie of the side inflating on the

245
00:08:34,230 --> 00:08:32,880
periphery of the vehicle uh

246
00:08:36,949 --> 00:08:34,240
look for this on instagram maybe a

247
00:08:38,469 --> 00:08:36,959
little bit later but

248
00:08:40,149 --> 00:08:38,479
so from this video and from some of the

249
00:08:42,070 --> 00:08:40,159
data we got an understanding of how well

250
00:08:43,430 --> 00:08:42,080
the science performed

251
00:08:45,990 --> 00:08:43,440
and all indications are it did

252
00:08:47,910 --> 00:08:46,000
phenomenal it inflated very quickly and

253
00:08:49,350 --> 00:08:47,920
in a uniform manner and it did so

254
00:08:50,870 --> 00:08:49,360
without disturbing the motion of the

255
00:08:52,630 --> 00:08:50,880
vehicle i think you saw in the video how

256
00:08:53,670 --> 00:08:52,640
stable the vehicle was after the scion

257
00:08:55,269 --> 00:08:53,680
deployed this is something that's going

258
00:08:57,990 --> 00:08:55,279
to be very important as we consider

259
00:08:59,350 --> 00:08:58,000
using these devices at mars

260
00:09:00,870 --> 00:08:59,360
another one of the

261
00:09:02,550 --> 00:09:00,880
thoughts we had was as an inflated

262
00:09:04,630 --> 00:09:02,560
structure we were very concerned about

263
00:09:05,990 --> 00:09:04,640

how rigid the device would be

264
00:09:07,910 --> 00:09:06,000
is it going to hold its shape the way

265
00:09:10,150 --> 00:09:07,920
that we need to as it's flying through

266
00:09:12,150 --> 00:09:10,160
the atmosphere at over 3000 miles an

267
00:09:14,150 --> 00:09:12,160
hour we got to take measurements of how

268
00:09:16,790 --> 00:09:14,160
much distortion we saw

269
00:09:18,470 --> 00:09:16,800
and the early indication are that we saw

270
00:09:20,949 --> 00:09:18,480
measurement deflections on the order of

271
00:09:23,509 --> 00:09:20,959
about an eighth of an inch which for a

272
00:09:25,509 --> 00:09:23,519
20-foot diameter inflated structure is

273
00:09:26,870 --> 00:09:25,519
is pretty phenomenal pretty remarkable

274
00:09:29,030 --> 00:09:26,880
that we're able to get that degree of

275
00:09:31,590 --> 00:09:29,040
rigidity using only a few pounds per

276
00:09:33,590 --> 00:09:31,600
square inch about three psi as we fly

277
00:09:35,910 --> 00:09:33,600
through the atmosphere we're also able

278
00:09:37,990 --> 00:09:35,920
to measure the aerodynamics of the syad

279
00:09:39,910 --> 00:09:38,000
the drag and stability and all

280
00:09:41,750 --> 00:09:39,920
indications are that the aerodynamics

281
00:09:44,230 --> 00:09:41,760
were as expected or in some cases

282
00:09:46,150 --> 00:09:44,240
considerably better than expected

283
00:09:48,230 --> 00:09:46,160
from what we thought we would see

284
00:09:49,750 --> 00:09:48,240
all you know very favorable results for

285
00:09:51,990 --> 00:09:49,760
as we look towards using these devices

286
00:09:53,670 --> 00:09:52,000
on mars

287
00:09:55,269 --> 00:09:53,680
and we even got to explore another

288
00:09:56,389 --> 00:09:55,279

aspect which is how much pressure do you

289
00:09:58,150 --> 00:09:56,399
really need

290
00:10:00,870 --> 00:09:58,160
in this device to have it hold a rigid

291
00:10:02,150 --> 00:10:00,880
shape and we did that sort of in a

292
00:10:04,230 --> 00:10:02,160
new way

293
00:10:05,750 --> 00:10:04,240
remind you that the side is inflated

294
00:10:07,430 --> 00:10:05,760
only to about three pounds per square

295
00:10:09,350 --> 00:10:07,440
inch well atmospheric pressure here at

296
00:10:11,430 --> 00:10:09,360
sea level is about 15 pounds per square

297
00:10:13,750 --> 00:10:11,440
inch and so as the side is descending

298
00:10:15,269 --> 00:10:13,760
down through the atmosphere the pressure

299
00:10:16,790 --> 00:10:15,279
in the atmosphere begins building up and

300
00:10:19,110 --> 00:10:16,800
eventually it will overcome the three

301
00:10:21,110 --> 00:10:19,120
psi that we have inside it and the side

302
00:10:23,750 --> 00:10:21,120
will be in collapsing and so if you go

303
00:10:25,750 --> 00:10:23,760
to video two you actually see the side

304
00:10:27,110 --> 00:10:25,760
in a deflated state beginning to move

305
00:10:29,110 --> 00:10:27,120
around a little bit and so we can go

306
00:10:30,949 --> 00:10:29,120
back and see it what altitude and what

307
00:10:32,470 --> 00:10:30,959
pressure did the side begin deflating

308
00:10:34,389 --> 00:10:32,480
and get a better appreciation for how

309
00:10:35,910 --> 00:10:34,399
much pressure is going to be required uh

310
00:10:38,949 --> 00:10:35,920
particularly as again we use these

311
00:10:42,550 --> 00:10:40,630
another one of the phenomenal successes

312
00:10:44,870 --> 00:10:42,560
associated with this flight was the

313
00:10:47,110 --> 00:10:44,880

performance of a device we had a

314
00:10:49,190 --> 00:10:47,120
supersonic balloon it's an inflatable

315
00:10:51,509 --> 00:10:49,200
drag device we developed to help deploy

316
00:10:52,870 --> 00:10:51,519
our supersonic parachute and prior to

317
00:10:55,110 --> 00:10:52,880
this flight was certainly one of the

318
00:10:55,990 --> 00:10:55,120
riskiest elements of the entire flight

319
00:10:58,310 --> 00:10:56,000
uh

320
00:11:00,630 --> 00:10:58,320
the fears of the blue not inflating in

321
00:11:02,710 --> 00:11:00,640
visions were things that dominated my

322
00:11:05,670 --> 00:11:02,720
sleep in the the weeks preceding the

323
00:11:07,269 --> 00:11:05,680
test uh and so if we go to video three

324
00:11:09,430 --> 00:11:07,279
we have a high speed upload video of

325
00:11:12,710 --> 00:11:09,440
that blue the volute is packed very

326
00:11:14,630 --> 00:11:12,720
tightly into density the amount of oak

327
00:11:16,870 --> 00:11:14,640
wood and it shot out the back of the

328
00:11:19,030 --> 00:11:16,880
vehicle at 200 feet per second the

329
00:11:20,389 --> 00:11:19,040
vehicle is going 2500 miles an hour and

330
00:11:23,030 --> 00:11:20,399
you see how quickly the bluetooth

331
00:11:24,949 --> 00:11:23,040
inflates about 0.2 to 0.3 seconds the

332
00:11:26,949 --> 00:11:24,959
balut goes from the density of wood to a

333
00:11:29,750 --> 00:11:26,959
fully inflated size

334
00:11:31,190 --> 00:11:29,760
about the size of a small suv

335
00:11:33,110 --> 00:11:31,200
very successful

336
00:11:34,710 --> 00:11:33,120
you see some motion of the blue that's

337
00:11:37,110 --> 00:11:34,720
actually motion of the vehicle the blue

338
00:11:39,350 --> 00:11:37,120

itself was rock solid stable

339
00:11:41,269 --> 00:11:39,360
in the wake of this 15 foot diameter

340
00:11:42,630 --> 00:11:41,279
excuse me 20 foot diameter

341
00:11:45,350 --> 00:11:42,640
vehicle that's punching a hole through

342
00:11:46,870 --> 00:11:45,360
the atmosphere at 2 500 miles an hour

343
00:11:48,790 --> 00:11:46,880
all of the performance that we saw from

344
00:11:50,470 --> 00:11:48,800
the blue the drag and stability was much

345
00:11:52,230 --> 00:11:50,480
better than expected and it meant that

346
00:11:54,230 --> 00:11:52,240
we could use the blue to deliver the

347
00:11:56,710 --> 00:11:54,240
parachute to the conditions we needed to

348
00:11:58,470 --> 00:11:56,720
so if we go to the fourth video we see

349
00:12:00,470 --> 00:11:58,480
the beginning of the the supersonic

350
00:12:02,150 --> 00:12:00,480
parachute inflation so the blue is

351
00:12:04,310 --> 00:12:02,160
pulling the packed parachute off the

352
00:12:05,990 --> 00:12:04,320
back of the vehicle it's deploying all

353
00:12:07,829 --> 00:12:06,000
the ropes and rigging necessary to

354
00:12:09,110 --> 00:12:07,839
support the parachute as it's attached

355
00:12:11,190 --> 00:12:09,120
to the vehicle

356
00:12:13,030 --> 00:12:11,200
again the vehicle is going about 2500

357
00:12:14,629 --> 00:12:13,040
miles an hour and we see the parachute

358
00:12:17,190 --> 00:12:14,639
beginning to inflate this is all high

359
00:12:18,949 --> 00:12:17,200
speed slow motion here but very early on

360
00:12:20,949 --> 00:12:18,959
it begins developing tears and once it

361
00:12:22,710 --> 00:12:20,959
has those tears

362
00:12:24,870 --> 00:12:22,720
the the parachute structure just won't

363
00:12:26,389 --> 00:12:24,880

hold its geometry very well

364
00:12:28,470 --> 00:12:26,399
we've learned a lot from this video

365
00:12:29,910 --> 00:12:28,480
already we've learned for one that we

366
00:12:31,509 --> 00:12:29,920
have more to learn about supersonic

367
00:12:33,990 --> 00:12:31,519
parachute inflation

368
00:12:36,550 --> 00:12:34,000
the idea of taking 200 pounds of kevlar

369
00:12:39,269 --> 00:12:36,560
nylon and deploying it at 2500 miles an

370
00:12:41,750 --> 00:12:39,279
hour uh 200 pounds that inflated would

371
00:12:43,430 --> 00:12:41,760
be the size of a small warehouse

372
00:12:44,949 --> 00:12:43,440
is certainly a challenging endeavor

373
00:12:46,710 --> 00:12:44,959
there's a lot of physics to this problem

374
00:12:48,389 --> 00:12:46,720
that we're now getting new insights into

375
00:12:49,910 --> 00:12:48,399
that we've never had before and we're

376
00:12:52,389 --> 00:12:49,920
learning more about what it takes to

377
00:12:54,310 --> 00:12:52,399
build parachutes of this size that can

378
00:12:55,350 --> 00:12:54,320
be safely deployed at those conditions

379
00:12:56,870 --> 00:12:55,360
and we're going to take all of that

380
00:12:58,790 --> 00:12:56,880
knowledge and feed it towards our

381
00:13:00,870 --> 00:12:58,800
flights for next year so with that i'll

382
00:13:01,829 --> 00:13:00,880
hand it back to mark thanks

383
00:13:03,509 --> 00:13:01,839
so i'll show you a little bit what

384
00:13:04,790 --> 00:13:03,519
happened after the after that flight and

385
00:13:06,629 --> 00:13:04,800
after the experiment portion of the

386
00:13:07,350 --> 00:13:06,639
flight so we show the first video

387
00:13:08,949 --> 00:13:07,360
the

388
00:13:11,030 --> 00:13:08,959

before that we actually got some really

389
00:13:13,829 --> 00:13:11,040
interesting views during the powered

390
00:13:15,190 --> 00:13:13,839
flight of the balloon we had just been

391
00:13:17,190 --> 00:13:15,200
dropped from the balloon as you as you

392
00:13:19,350 --> 00:13:17,200
recall and you see the

393
00:13:20,710 --> 00:13:19,360
the balloon coming around

394
00:13:23,110 --> 00:13:20,720
in the view there there's there chose

395
00:13:24,629 --> 00:13:23,120
once and again um and so we really like

396
00:13:26,069 --> 00:13:24,639
getting these these views of our launch

397
00:13:27,509 --> 00:13:26,079
system and it allowed us to see exactly

398
00:13:30,069 --> 00:13:27,519
how that balloon performed and how the

399
00:13:31,670 --> 00:13:30,079
balloon broke up after the flight uh the

400
00:13:33,670 --> 00:13:31,680
balloon performed fantastic and show the

401
00:13:35,350 --> 00:13:33,680
next picture

402
00:13:37,990 --> 00:13:35,360
this is a

403
00:13:39,189 --> 00:13:38,000
a picture of the of the balloon itself

404
00:13:40,310 --> 00:13:39,199
if we can get it

405
00:13:41,910 --> 00:13:40,320
there's the balloon so you can see the

406
00:13:42,870 --> 00:13:41,920
fully inflated balloon just after we had

407
00:13:44,230 --> 00:13:42,880
been dropped from it the balloon

408
00:13:45,990 --> 00:13:44,240
performed great we're very happy with is

409
00:13:47,269 --> 00:13:46,000
provided by the and it's operation

410
00:13:49,189 --> 00:13:47,279
provided by the columbia scientific

411
00:13:51,350 --> 00:13:49,199
balloon facility out of palestine texas

412
00:13:53,030 --> 00:13:51,360
and we're very expecting to hoping to

413
00:13:54,389 --> 00:13:53,040

work with them again next year to launch

414
00:13:55,910 --> 00:13:54,399
two more of these so

415
00:13:56,870 --> 00:13:55,920
fantastic job i'd like to thank those

416
00:13:59,110 --> 00:13:56,880
guys

417
00:14:00,550 --> 00:13:59,120
next video so next picture so this is

418
00:14:02,150 --> 00:14:00,560
actually underwater so of course the

419
00:14:04,470 --> 00:14:02,160
vehicle once it finished its flight

420
00:14:06,150 --> 00:14:04,480
impacted the water uh about half an hour

421
00:14:08,230 --> 00:14:06,160
later and this is that parachute

422
00:14:09,670 --> 00:14:08,240
underwater looks like a big jellyfish

423
00:14:11,670 --> 00:14:09,680
and so we had to bring that out of the

424
00:14:13,430 --> 00:14:11,680
water next picture

425
00:14:15,829 --> 00:14:13,440
this is our test vehicle floating on the

426
00:14:17,670 --> 00:14:15,839
water it was designed to flood it was it

427
00:14:18,949 --> 00:14:17,680
the core structure actually has foam

428
00:14:20,470 --> 00:14:18,959
core in it so that even the vehicle

429
00:14:22,310 --> 00:14:20,480
fills with water will float so that we

430
00:14:23,990 --> 00:14:22,320
can recover it um so this is our

431
00:14:25,910 --> 00:14:24,000
supersonic space boat floating out there

432
00:14:27,750 --> 00:14:25,920
in the middle of pacific ocean uh we

433
00:14:29,430 --> 00:14:27,760
have our two eod guys these are

434
00:14:31,269 --> 00:14:29,440
explosive ordnance disposal guys from

435
00:14:32,790 --> 00:14:31,279
the navy they are divers that helped us

436
00:14:34,470 --> 00:14:32,800
bring the vehicle back a fantastic team

437
00:14:35,750 --> 00:14:34,480
of guys from the navy that helped with

438
00:14:37,509 --> 00:14:35,760

that and they were sitting on there

439
00:14:39,189 --> 00:14:37,519
waiting for the large boat to come along

440
00:14:41,430 --> 00:14:39,199
uh with the crane to get the vehicle out

441
00:14:42,949 --> 00:14:41,440
of the water so next slide we have in

442
00:14:45,110 --> 00:14:42,959
fact this is large boat the kahana with

443
00:14:46,550 --> 00:14:45,120
the crane pulling the vehicle up out of

444
00:14:47,750 --> 00:14:46,560
the water and bringing it onto the boat

445
00:14:49,509 --> 00:14:47,760
we didn't have an aircraft carrier but

446
00:14:51,269 --> 00:14:49,519
we had this great cargo boat which

447
00:14:52,470 --> 00:14:51,279
helped us get to get the vehicle back

448
00:14:54,150 --> 00:14:52,480
back to shore where we were able to get

449
00:14:56,550 --> 00:14:54,160
the data so a lot of this video you saw

450
00:14:58,069 --> 00:14:56,560
in fact almost all the video you saw

451
00:14:59,509 --> 00:14:58,079
and the and the data that we got from

452
00:15:00,870 --> 00:14:59,519
the vehicle we got by bringing the

453
00:15:02,389 --> 00:15:00,880
vehicle back and pulling cards and

454
00:15:03,430 --> 00:15:02,399
memory cards and stuff off the vehicle

455
00:15:04,949 --> 00:15:03,440
so it was very important for us to

456
00:15:06,629 --> 00:15:04,959
recover the vehicle and get all that

457
00:15:09,110 --> 00:15:06,639
data back and the the recovery guys did

458
00:15:10,310 --> 00:15:09,120
a great job as well next slide we also

459
00:15:11,509 --> 00:15:10,320
brought the parachute back as you saw

460
00:15:12,710 --> 00:15:11,519
the big jellyfish in the water we got

461
00:15:14,069 --> 00:15:12,720
that out of the water and brought onto

462
00:15:15,670 --> 00:15:14,079
the boat in addition to the videos the

463
00:15:17,189 --> 00:15:15,680

examination of the physical parachute

464
00:15:18,230 --> 00:15:17,199
itself was very important in

465
00:15:19,910 --> 00:15:18,240
understanding what happened in its

466
00:15:21,829 --> 00:15:19,920
flight how it behaved and

467
00:15:23,509 --> 00:15:21,839
and what happened uh you know during

468
00:15:25,430 --> 00:15:23,519
during the the portion of the flight

469
00:15:26,790 --> 00:15:25,440
where it initially deployed and started

470
00:15:29,509 --> 00:15:26,800
to come apart

471
00:15:30,710 --> 00:15:29,519
so next slide uh so now we're we're very

472
00:15:32,230 --> 00:15:30,720
happy that we got all that data we've

473
00:15:33,590 --> 00:15:32,240
now had a very successful shakeout

474
00:15:35,269 --> 00:15:33,600
flight we've shown the vehicle can do

475
00:15:36,710 --> 00:15:35,279
what it needs to do it's able to get the

476
00:15:37,990 --> 00:15:36,720
technologies to conditions it's able to

477
00:15:39,269 --> 00:15:38,000
collect all the data it's able to get

478
00:15:40,949 --> 00:15:39,279
all the imagery we're able to

479
00:15:41,910 --> 00:15:40,959
reconstruct the trajectory know

480
00:15:43,110 --> 00:15:41,920
everything we need to know about these

481
00:15:45,030 --> 00:15:43,120
technologies so next year we're going to

482
00:15:46,550 --> 00:15:45,040
really test them we have two flights

483
00:15:48,870 --> 00:15:46,560
scheduled for next summer in the june

484
00:15:50,790 --> 00:15:48,880
july august time frame we're going to be

485
00:15:52,629 --> 00:15:50,800
flying again two more syads and two

486
00:15:53,910 --> 00:15:52,639
parachutes redesigned rebuilt parachutes

487
00:15:56,150 --> 00:15:53,920
based on what we learned from this first

488
00:15:57,829 --> 00:15:56,160

flight and right here we see the first

489
00:15:59,590 --> 00:15:57,839
of the of the two core structures that

490
00:16:00,710 --> 00:15:59,600
have been delivered to our jpl high bay

491
00:16:02,150 --> 00:16:00,720
we're going to be doing integration and

492
00:16:04,230 --> 00:16:02,160
test starting in this vehicle very soon

493
00:16:05,670 --> 00:16:04,240
we'll get a second one delivered uh in a

494
00:16:07,990 --> 00:16:05,680
couple months and start integration and

495
00:16:10,470 --> 00:16:08,000
test on that and we'll be back in kauai

496
00:16:11,910 --> 00:16:10,480
next summer to do some more tests so

497
00:16:14,629 --> 00:16:11,920
with that oh i think jane we can turn it

498
00:16:16,310 --> 00:16:14,639
over to questions okay thank you i do

499
00:16:18,470 --> 00:16:16,320
want to mention that these visuals will

500
00:16:21,509 --> 00:16:18,480
be replayed immediately after this

501
00:16:27,870 --> 00:16:21,519
broadcast and the entire show also will

502
00:16:30,550 --> 00:16:29,509
nasajpl2.

503
00:16:33,189 --> 00:16:30,560
all right we're going to take some

504
00:16:36,870 --> 00:16:33,199
questions as mark said uh and we do have

505
00:16:38,550 --> 00:16:36,880
some also from social media

506
00:16:40,870 --> 00:16:38,560
in fact let's take our first question

507
00:16:42,710 --> 00:16:40,880
from twitter and the question is how

508
00:16:45,590 --> 00:16:42,720
long was this project in the works

509
00:16:46,629 --> 00:16:45,600
before fruition and whose ideas were

510
00:16:49,030 --> 00:16:46,639
they

511
00:16:51,110 --> 00:16:49,040
okay so let's see the project started in

512
00:16:53,350 --> 00:16:51,120
september of 2010

513
00:16:54,949 --> 00:16:53,360

that was when we first got initial funds

514
00:16:57,110 --> 00:16:54,959
to start studying the concept and see

515
00:16:58,470 --> 00:16:57,120
what we should do what we could do

516
00:17:00,230 --> 00:16:58,480
what would be the most valuable thing to

517
00:17:01,749 --> 00:17:00,240
do we were in formulation for a couple

518
00:17:03,269 --> 00:17:01,759
years to understand what were the best

519
00:17:05,510 --> 00:17:03,279
technologies to test

520
00:17:06,789 --> 00:17:05,520
we got confirmation in december of 2012

521
00:17:08,470 --> 00:17:06,799
that's when we really got fired up with

522
00:17:09,590 --> 00:17:08,480
the implementation started putting

523
00:17:10,789 --> 00:17:09,600
together buying the hardware putting

524
00:17:12,470 --> 00:17:10,799
together hardware getting it all built

525
00:17:13,350 --> 00:17:12,480
up so it took us a good year and a half

526
00:17:14,710 --> 00:17:13,360
to get to the point where we could

527
00:17:16,150 --> 00:17:14,720
actually conduct the flight with the

528
00:17:18,069 --> 00:17:16,160
with the systems we put together in

529
00:17:19,510 --> 00:17:18,079
terms of who i whose idea was actually

530
00:17:21,590 --> 00:17:19,520
it started with the

531
00:17:24,470 --> 00:17:21,600
the chief technologist at nasa bobby

532
00:17:26,789 --> 00:17:24,480
braun at the time um who was uh who felt

533
00:17:28,309 --> 00:17:26,799
this would be a good initial project for

534
00:17:29,669 --> 00:17:28,319
the space technology mission director at

535
00:17:31,430 --> 00:17:29,679
the time called the space technology

536
00:17:33,190 --> 00:17:31,440
program and they started i think it was

537
00:17:35,190 --> 00:17:33,200
eight or nine projects at that time this

538
00:17:37,750 --> 00:17:35,200

and ldst was one of them as their

539
00:17:39,190 --> 00:17:37,760
initial foray to to get data as jeff

540
00:17:40,789 --> 00:17:39,200
said we're starting to get data now

541
00:17:42,070 --> 00:17:40,799
starting to come to fruition i'm

542
00:17:44,150 --> 00:17:42,080
starting to see results from all of

543
00:17:45,669 --> 00:17:44,160
these projects and nldsd was one of them

544
00:17:46,390 --> 00:17:45,679
i don't even if you have any more on the

545
00:17:48,470 --> 00:17:46,400
on the

546
00:17:50,230 --> 00:17:48,480
origins of the project well certainly

547
00:17:52,230 --> 00:17:50,240
the origins of supersonic inflatable

548
00:17:53,909 --> 00:17:52,240
decelerators go back to as soon as we

549
00:17:54,870 --> 00:17:53,919
started sending things into space we

550
00:17:57,029 --> 00:17:54,880
started trying to figure out how to

551
00:17:58,789 --> 00:17:57,039
bring them back safely uh one of the

552
00:18:00,470 --> 00:17:58,799
early concepts were inflatable drag

553
00:18:02,789 --> 00:18:00,480
devices and so those go back to the

554
00:18:05,190 --> 00:18:02,799
1960s uh supersonic parachutes

555
00:18:07,750 --> 00:18:05,200
themselves even go back to the 1960s the

556
00:18:09,190 --> 00:18:07,760
specific incarnation of the inflatable

557
00:18:10,710 --> 00:18:09,200
drag devices that we were testing were

558
00:18:13,110 --> 00:18:10,720
really things developed

559
00:18:16,070 --> 00:18:13,120
more recently here at jpl and across

560
00:18:17,590 --> 00:18:16,080
nasa with the the ldst team so

561
00:18:18,789 --> 00:18:17,600
i'd say there's a long history you know

562
00:18:20,470 --> 00:18:18,799
decades of this kind of stuff but

563
00:18:23,350 --> 00:18:20,480

certainly the ones that we were testing

564
00:18:24,950 --> 00:18:23,360
are more recent in nature

565
00:18:26,310 --> 00:18:24,960
all right thank you and we have a

566
00:18:27,990 --> 00:18:26,320
question on the phone and i should

567
00:18:29,990 --> 00:18:28,000
mention for those reporters who are

568
00:18:31,669 --> 00:18:30,000
listening in on the phone if you do have

569
00:18:33,270 --> 00:18:31,679
a question press star one and the

570
00:18:35,350 --> 00:18:33,280
operator will get you in the queue so we

571
00:18:37,270 --> 00:18:35,360
can call on you and if any of the media

572
00:18:39,350 --> 00:18:37,280
here at jpl have a question just raise

573
00:18:41,270 --> 00:18:39,360
your hand and we'll try to get a mic

574
00:18:42,950 --> 00:18:41,280
over to you quickly and you can ask your

575
00:18:45,830 --> 00:18:42,960
question in the meantime we're going to

576
00:18:49,350 --> 00:18:45,840
take a question from julia rosen of the

577
00:18:51,190 --> 00:18:49,360
la times and she's on the phone hi julia

578
00:18:54,230 --> 00:18:51,200
hello um first i just want to say

579
00:18:56,390 --> 00:18:54,240
congratulations on the successful test

580
00:18:58,470 --> 00:18:56,400
and i was curious if um given the

581
00:19:00,230 --> 00:18:58,480
success of the smaller side if this

582
00:19:03,029 --> 00:19:00,240
means that it's likely you'll be able to

583
00:19:05,830 --> 00:19:03,039
test the larger science next year during

584
00:19:07,270 --> 00:19:05,840
your planned experiments

585
00:19:09,510 --> 00:19:07,280
okay so our current plans right now are

586
00:19:11,750 --> 00:19:09,520
to test the smaller side again twice

587
00:19:13,430 --> 00:19:11,760
more with the large parachute this is

588
00:19:14,470 --> 00:19:13,440

important mainly for the parachute to

589
00:19:16,070 --> 00:19:14,480
give the right conditions for the

590
00:19:17,750 --> 00:19:16,080
parachute we hope to have opportunities

591
00:19:19,510 --> 00:19:17,760
later to test the larger side we are

592
00:19:21,590 --> 00:19:19,520
going to be doing uh we expect rocket

593
00:19:24,470 --> 00:19:21,600
sled testing on the ground of the larger

594
00:19:25,990 --> 00:19:24,480
side this this coming year so that we

595
00:19:27,110 --> 00:19:26,000
can see how the device operates and make

596
00:19:28,470 --> 00:19:27,120
sure that has the proper strength

597
00:19:30,150 --> 00:19:28,480
characteristics and if you have anything

598
00:19:31,510 --> 00:19:30,160
more on the large side no i mean

599
00:19:33,350 --> 00:19:31,520
certainly the success so the smaller

600
00:19:34,950 --> 00:19:33,360
side has started to ask questions about

601
00:19:37,430 --> 00:19:34,960
how do we grow the size of this

602
00:19:39,830 --> 00:19:37,440
particular configuration or how do we

603
00:19:41,190 --> 00:19:39,840
mature larger sides like the one that

604
00:19:42,870 --> 00:19:41,200
we'll be doing the rocket sled testing

605
00:19:47,190 --> 00:19:42,880
on so those are all things that we'll be

606
00:19:50,549 --> 00:19:48,549
all right we're going to take our next

607
00:19:52,470 --> 00:19:50,559
question also from the phone lines alan

608
00:19:53,909 --> 00:19:52,480
boyle with nbc

609
00:19:56,630 --> 00:19:53,919
hi on

610
00:19:58,230 --> 00:19:56,640
hi thank you i think this is a question

611
00:20:00,230 --> 00:19:58,240
for ian you were talking about the

612
00:20:02,310 --> 00:20:00,240
lessons learned about the parachute

613
00:20:05,430 --> 00:20:02,320

could you provide any more details about

614
00:20:08,070 --> 00:20:05,440
how you avoid that sort of tear and and

615
00:20:09,110 --> 00:20:08,080
what sorts of uh what sort of options

616
00:20:11,750 --> 00:20:09,120
you're looking at for the next

617
00:20:13,190 --> 00:20:11,760
generation parachute sure

618
00:20:14,549 --> 00:20:13,200
uh

619
00:20:16,070 --> 00:20:14,559
when we built this parachute we were

620
00:20:18,870 --> 00:20:16,080
really designing a parachute that we

621
00:20:21,190 --> 00:20:18,880
were optimizing for drag and stability

622
00:20:23,110 --> 00:20:21,200
and subsonic steady state descent what

623
00:20:24,870 --> 00:20:23,120
we didn't have was a lot of insight into

624
00:20:26,310 --> 00:20:24,880
the nature of supersonic parachute

625
00:20:27,430 --> 00:20:26,320
inflation and some of the physics that

626
00:20:30,070 --> 00:20:27,440
governed it

627
00:20:32,149 --> 00:20:30,080
what we saw from this test was that the

628
00:20:34,390 --> 00:20:32,159
shape of the parachute is extremely

629
00:20:36,149 --> 00:20:34,400
important the shape of the parachute we

630
00:20:37,990 --> 00:20:36,159
had we don't think was particularly

631
00:20:39,669 --> 00:20:38,000
robust to a lot of these intermediate

632
00:20:41,830 --> 00:20:39,679
states that you can have as the

633
00:20:43,270 --> 00:20:41,840
parachutes inflating at 2500 miles an

634
00:20:45,110 --> 00:20:43,280
hour

635
00:20:46,870 --> 00:20:45,120
we are going to change the shape we are

636
00:20:48,549 --> 00:20:46,880
going to add some structural

637
00:20:50,470 --> 00:20:48,559
skeletal reinforcements to make it

638
00:20:52,310 --> 00:20:50,480

stronger in areas that we think it's

639
00:20:53,510 --> 00:20:52,320
particularly sensitive to

640
00:20:55,029 --> 00:20:53,520
and we're going to improve the

641
00:20:57,270 --> 00:20:55,039
deployment of the parachute try to

642
00:20:58,230 --> 00:20:57,280
present it in as clean a manner as we

643
00:21:01,190 --> 00:20:58,240
can

644
00:21:04,230 --> 00:21:01,200
again in this very turbulent very fast

645
00:21:05,750 --> 00:21:04,240
dynamic airflow

646
00:21:10,149 --> 00:21:05,760
okay our next question from the phone

647
00:21:12,310 --> 00:21:10,159
lines is miriam cramer at space.com

648
00:21:14,390 --> 00:21:12,320
hi thanks so much um i actually had a

649
00:21:16,390 --> 00:21:14,400
similar question alan so i i guess sort

650
00:21:18,789 --> 00:21:16,400
of a follow up on that um

651
00:21:21,110 --> 00:21:18,799
so what specifically what kind of

652
00:21:23,830 --> 00:21:21,120
what shapes are you looking at to to

653
00:21:25,110 --> 00:21:23,840
make it um a little bit more stable

654
00:21:27,510 --> 00:21:25,120
along with those

655
00:21:29,669 --> 00:21:27,520
structural reinforcements yep the uh the

656
00:21:31,750 --> 00:21:29,679
shape modifications are aimed at making

657
00:21:34,470 --> 00:21:31,760
it more robust to some of the inflation

658
00:21:37,190 --> 00:21:34,480
transients that it sees the shape that

659
00:21:39,430 --> 00:21:37,200
we had had a uh you essentially take a

660
00:21:41,590 --> 00:21:39,440
very curved parachute but we had

661
00:21:43,510 --> 00:21:41,600
flattened the top of it what happens

662
00:21:46,149 --> 00:21:43,520
with a very flat structure of parachute

663
00:21:48,390 --> 00:21:46,159

by nature is sort of a pressure vessel

664
00:21:49,669 --> 00:21:48,400
pressure vessels you don't see too many

665
00:21:51,190 --> 00:21:49,679
box shaped

666
00:21:53,190 --> 00:21:51,200
pressure tanks for example they like to

667
00:21:55,350 --> 00:21:53,200
be curved and so we're going to go back

668
00:21:56,549 --> 00:21:55,360
to including more curvature in regions

669
00:21:57,830 --> 00:21:56,559
of the parachute that would be

670
00:22:00,710 --> 00:21:57,840
susceptible to some of these high

671
00:22:05,510 --> 00:22:02,789
okay we have a question here at jpl in

672
00:22:06,789 --> 00:22:05,520
the back row yeah following up on

673
00:22:08,710 --> 00:22:06,799
following up on the parachute robert

674
00:22:09,909 --> 00:22:08,720
legend with abc7

675
00:22:11,510 --> 00:22:09,919
forgive my ignorance here but if i

676
00:22:13,110 --> 00:22:11,520
remember correctly the

677
00:22:14,630 --> 00:22:13,120
it won't fully work

678
00:22:16,070 --> 00:22:14,640
without one or the other right the

679
00:22:17,909 --> 00:22:16,080
parachute has to work in conjunction

680
00:22:19,669 --> 00:22:17,919
with the inflatable right in order to

681
00:22:21,669 --> 00:22:19,679
get the full benefit in order to be able

682
00:22:23,990 --> 00:22:21,679
to land very large payloads you need

683
00:22:25,909 --> 00:22:24,000
both the syad and the parachute the side

684
00:22:27,430 --> 00:22:25,919
helps slow the vehicle down further and

685
00:22:28,950 --> 00:22:27,440
get it to conditions that you can deploy

686
00:22:31,029 --> 00:22:28,960
the parachute but you need a large

687
00:22:32,310 --> 00:22:31,039
parachute to slow that even further down

688
00:22:33,909 --> 00:22:32,320

and get it to the point where you can

689
00:22:36,149 --> 00:22:33,919
use something like a sky crane like what

690
00:22:37,909 --> 00:22:36,159
msl used a few years ago so we do want

691
00:22:39,590 --> 00:22:37,919
to mature both technologies we've been

692
00:22:40,789 --> 00:22:39,600
able to mature the side a year ahead of

693
00:22:42,310 --> 00:22:40,799
schedule

694
00:22:43,909 --> 00:22:42,320
and we got to test the parachute and

695
00:22:45,270 --> 00:22:43,919
learn from the parachute and now we get

696
00:22:47,029 --> 00:22:45,280
to apply those lessons learned for our

697
00:22:48,390 --> 00:22:47,039
flights next year i think you just

698
00:22:49,830 --> 00:22:48,400
answered my next question which is how

699
00:22:51,909 --> 00:22:49,840
you would define this still as a

700
00:22:53,669 --> 00:22:51,919
successful gathering of information

701
00:22:55,110 --> 00:22:53,679
despite the failure oh absolutely i mean

702
00:22:56,470 --> 00:22:55,120
this flight was was really just a

703
00:22:58,630 --> 00:22:56,480
shakeout flight

704
00:23:00,470 --> 00:22:58,640
we got to put the technologies on this

705
00:23:01,990 --> 00:23:00,480
vehicle a year ahead of schedule and see

706
00:23:03,909 --> 00:23:02,000
how they performed

707
00:23:05,750 --> 00:23:03,919
the side performed amazing phenomenal

708
00:23:07,430 --> 00:23:05,760
from all the data and we can now say

709
00:23:09,110 --> 00:23:07,440
that it's a device that's mature enough

710
00:23:10,870 --> 00:23:09,120
to be used at mars

711
00:23:12,789 --> 00:23:10,880
we got early data on the parachute and

712
00:23:15,750 --> 00:23:12,799
we can apply that data to the real tests

713
00:23:21,510 --> 00:23:18,710

okay we have a question now from a

714
00:23:25,990 --> 00:23:21,520
student via social media what gas does

715
00:23:30,549 --> 00:23:28,549
uh we use two different kinds of gas

716
00:23:32,310 --> 00:23:30,559
one of them is just a cold nitrogen

717
00:23:33,669 --> 00:23:32,320
compressed nitrogen that we use to begin

718
00:23:35,669 --> 00:23:33,679
inflating

719
00:23:37,830 --> 00:23:35,679
the side we actually use commercial

720
00:23:39,029 --> 00:23:37,840
off-the-shelf automotive gas generators

721
00:23:40,710 --> 00:23:39,039
like the ones that sit behind your

722
00:23:42,230 --> 00:23:40,720
steering wheel and help inflate the

723
00:23:43,590 --> 00:23:42,240
airbags

724
00:23:45,430 --> 00:23:43,600
the first round of those are just

725
00:23:47,029 --> 00:23:45,440
compressed nitrogen helping get some of

726
00:23:48,950 --> 00:23:47,039
the first initial pressure and push the

727
00:23:50,149 --> 00:23:48,960
side out to the free stream

728
00:23:52,149 --> 00:23:50,159
and then we just use those gas

729
00:23:53,990 --> 00:23:52,159
generators so i'm not sure about the

730
00:23:55,830 --> 00:23:54,000
exact composition of the gas but it's

731
00:24:00,470 --> 00:23:55,840
something identical to what would be

732
00:24:03,909 --> 00:24:01,430
okay

733
00:24:07,430 --> 00:24:03,919
do we have any more questions here at

734
00:24:10,710 --> 00:24:08,950
well i think that

735
00:24:12,310 --> 00:24:10,720
is going to wrap things up for today

736
00:24:15,029 --> 00:24:12,320
then

737
00:24:16,830 --> 00:24:15,039
the visuals will be oh i'm sorry we do

738
00:24:19,590 --> 00:24:16,840

have a twitter

739
00:24:20,950 --> 00:24:19,600
question we actually have we have one

740
00:24:22,630 --> 00:24:20,960
twitter question and we have two from

741
00:24:25,110 --> 00:24:22,640
our ustream chat

742
00:24:27,110 --> 00:24:25,120
so first up from twitter carlos asks

743
00:24:29,510 --> 00:24:27,120
have different syad configurations been

744
00:24:32,549 --> 00:24:29,520
looked into like large petals instead of

745
00:24:34,149 --> 00:24:32,559
a single large ring

746
00:24:36,549 --> 00:24:34,159
we before we came up with this

747
00:24:37,990 --> 00:24:36,559
particular configuration there's a

748
00:24:40,149 --> 00:24:38,000
number of configurations that have been

749
00:24:41,510 --> 00:24:40,159
proposed again over the past four or

750
00:24:43,190 --> 00:24:41,520
five decades

751
00:24:45,430 --> 00:24:43,200
we chose one that was initially one that

752
00:24:47,350 --> 00:24:45,440
we thought would be a good first step in

753
00:24:49,190 --> 00:24:47,360
developing inflatable technologies some

754
00:24:50,950 --> 00:24:49,200
of these other configurations deployable

755
00:24:52,710 --> 00:24:50,960
pedals those are things also being

756
00:24:54,390 --> 00:24:52,720
looked at nasa for different

757
00:24:56,070 --> 00:24:54,400
applications maybe deploying them at the

758
00:24:57,269 --> 00:24:56,080
top of the atmosphere before we actually

759
00:24:59,190 --> 00:24:57,279
enter

760
00:25:00,950 --> 00:24:59,200
the vehicle

761
00:25:02,630 --> 00:25:00,960
those sorts of concepts are certainly

762
00:25:03,510 --> 00:25:02,640
out there and folks are looking at them

763
00:25:05,269 --> 00:25:03,520

but

764
00:25:07,750 --> 00:25:05,279
for inflatable decelerator the

765
00:25:09,430 --> 00:25:07,760
configuration we picked was a logical

766
00:25:12,870 --> 00:25:09,440
first step

767
00:25:14,950 --> 00:25:12,880
going to our ustream chat um luis asks

768
00:25:16,710 --> 00:25:14,960
would it be useful to place a viable

769
00:25:19,350 --> 00:25:16,720
payload um

770
00:25:21,990 --> 00:25:19,360
to be able oh excuse me

771
00:25:23,669 --> 00:25:22,000
um let's move on to em harris could the

772
00:25:26,310 --> 00:25:23,679
researchers speak to other potential

773
00:25:27,669 --> 00:25:26,320
applications of the parachute

774
00:25:30,870 --> 00:25:27,679
certainly i mean we use parachutes all

775
00:25:33,510 --> 00:25:30,880
the time uh in parachutes are a mainstay

776
00:25:35,269 --> 00:25:33,520
of our planetary exploration emissions

777
00:25:36,390 --> 00:25:35,279
uh any environment that has an

778
00:25:38,070 --> 00:25:36,400
atmosphere

779
00:25:39,430 --> 00:25:38,080
is likely to see parachute because you

780
00:25:42,070 --> 00:25:39,440
want to slow the vehicle down as it

781
00:25:43,909 --> 00:25:42,080
enters that atmosphere so uh parachutes

782
00:25:45,510 --> 00:25:43,919
the size of the one we're testing are

783
00:25:47,750 --> 00:25:45,520
not dissimilar from the parachutes that

784
00:25:49,830 --> 00:25:47,760
we use for the orion capsule

785
00:25:51,750 --> 00:25:49,840
or that we used for the apollo capsule

786
00:25:53,669 --> 00:25:51,760
uh deploying them at the conditions we

787
00:25:55,430 --> 00:25:53,679
deploy is something unique and the

788
00:25:58,950 --> 00:25:55,440

challenges we face are somewhat unique

789
00:26:00,390 --> 00:25:58,960
to to mars exploration in particular

790
00:26:02,470 --> 00:26:00,400
but that doesn't mean that you couldn't

791
00:26:04,630 --> 00:26:02,480
find applications outside of mars

792
00:26:06,310 --> 00:26:04,640
elsewhere in the solar system okay and

793
00:26:08,310 --> 00:26:06,320
our last that i'm seeing here in the

794
00:26:11,110 --> 00:26:08,320
chat do you have any other missions

795
00:26:13,269 --> 00:26:11,120
lined up that will use the syad

796
00:26:14,950 --> 00:26:13,279
the uh we're gonna well

797
00:26:17,029 --> 00:26:14,960
our project has two more flights to the

798
00:26:19,029 --> 00:26:17,039
side uh next year at least two more

799
00:26:20,549 --> 00:26:19,039
flights hopefully um

800
00:26:22,390 --> 00:26:20,559
in terms of missions that will be

801
00:26:24,710 --> 00:26:22,400
utilizing the side

802
00:26:26,390 --> 00:26:24,720
we look you know on the horizon towards

803
00:26:29,350 --> 00:26:26,400
a number of different concepts for

804
00:26:30,710 --> 00:26:29,360
missions to mars uh maybe mark or jeff

805
00:26:32,310 --> 00:26:30,720
can can talk a little bit more about

806
00:26:33,990 --> 00:26:32,320
some of those well wherever we want to

807
00:26:36,149 --> 00:26:34,000
land more mass on mars if you've seen it

808
00:26:37,430 --> 00:26:36,159
our rovers have gotten very large over

809
00:26:39,110 --> 00:26:37,440
time we started with the sojourner

810
00:26:40,630 --> 00:26:39,120
rovers maybe like you know this big size

811
00:26:42,230 --> 00:26:40,640
of a microwave and we went to mars

812
00:26:44,070 --> 00:26:42,240
exploration rover like a golf cart and

813
00:26:45,110 --> 00:26:44,080

then we go to curiosity the thing is the

814
00:26:46,710 --> 00:26:45,120
size of a mini cooper we're going to

815
00:26:48,549 --> 00:26:46,720
keep getting bigger and bigger and so

816
00:26:50,789 --> 00:26:48,559
that's exactly what these things are for

817
00:26:52,950 --> 00:26:50,799
the syad the large parachute is to large

818
00:26:54,390 --> 00:26:52,960
land larger payloads on mars we expect

819
00:26:56,070 --> 00:26:54,400
our payloads to get larger as we go into

820
00:26:57,669 --> 00:26:56,080
the future there will be missions that

821
00:26:59,110 --> 00:26:57,679
put larger rovers on mars to do more in

822
00:27:01,029 --> 00:26:59,120
situ investigation missions to

823
00:27:02,470 --> 00:27:01,039
potentially go collect rocks missions to

824
00:27:04,070 --> 00:27:02,480
try and launch them from the surface of

825
00:27:05,510 --> 00:27:04,080
mars and so those are going to require

826
00:27:07,029 --> 00:27:05,520
larger and larger vehicles eventually we

827
00:27:08,789 --> 00:27:07,039
want to get to be able to as jeff was

828
00:27:09,990 --> 00:27:08,799
talking about land people on mars are

829
00:27:12,149 --> 00:27:10,000
going to want to put two-story

830
00:27:13,590 --> 00:27:12,159
condominiums on the surface of mars and

831
00:27:15,750 --> 00:27:13,600
that gets really big and really hard and

832
00:27:18,630 --> 00:27:15,760
so really this is like the second step

833
00:27:20,310 --> 00:27:18,640
of a 12-step program to get to the point

834
00:27:21,510 --> 00:27:20,320
where we can put very very large things

835
00:27:22,710 --> 00:27:21,520
on mars there's a lot of things we're

836
00:27:24,310 --> 00:27:22,720
going to have to do between now and when

837
00:27:25,830 --> 00:27:24,320
we put people on mars and we're just

838
00:27:27,269 --> 00:27:25,840

getting started now with these kinds of

839
00:27:29,269 --> 00:27:27,279
technologies

840
00:27:31,830 --> 00:27:29,279
all right thank you very much i think

841
00:27:34,070 --> 00:27:31,840
that wraps it up for our q a and i want

842
00:27:35,669 --> 00:27:34,080
to thank our panelists and a couple of

843
00:27:38,710 --> 00:27:35,679
reminders that you can join the

844
00:27:40,389 --> 00:27:38,720
conversation about ldsd on social media

845
00:27:43,510 --> 00:27:40,399
using the hashtag

846
00:27:46,630 --> 00:27:43,520
three two one tech off

847
00:27:49,830 --> 00:27:46,640
and hashtag ldsd

848
00:27:51,909 --> 00:27:49,840
and in addition the visuals will be

849
00:27:56,830 --> 00:27:51,919
replayed here and they also will be

850
00:28:01,830 --> 00:27:58,389
ldsd

851
00:28:07,190 --> 00:28:01,840
and the replay again will be on nasa tv

852
00:28:11,269 --> 00:28:09,430
and a reminder that we'll be

853
00:28:13,510 --> 00:28:11,279
back i guess next summer

854
00:28:15,830 --> 00:28:13,520
for another another test so we'll keep

855
00:28:16,870 --> 00:28:15,840
you posted on that for two more tests as

856
00:28:19,190 --> 00:28:16,880
we

857
00:28:21,350 --> 00:28:19,200
gear up for that and there'll be some

858
00:28:23,110 --> 00:28:21,360
updates before then for sure

859
00:29:11,909 --> 00:28:23,120
thanks everybody for joining us and have

860
00:29:48,470 --> 00:29:28,149
or

861
00:29:50,549 --> 00:29:49,430
four

862
00:29:51,510 --> 00:29:50,559
three

863
00:30:04,230 --> 00:29:51,520

two

864
00:30:12,070 --> 00:30:05,909
mark four

865
00:30:12,080 --> 00:30:30,389
confirmed