



1
00:00:09,519 --> 00:00:16,070
things are looking good

2
00:00:16,080 --> 00:00:20,950
entry interface

3
00:00:25,509 --> 00:00:22,390
we're not beginning to feel the

4
00:00:27,109 --> 00:00:25,519
atmosphere uh as we go in here

5
00:00:29,589 --> 00:00:27,119
uh it is reporting that we are seeing

6
00:00:32,870 --> 00:00:29,599
g's on the order of uh 11 to 12 earth

7
00:00:35,830 --> 00:00:34,549
2 is starting

8
00:00:39,910 --> 00:00:35,840
we are now getting telemetry from

9
00:00:46,709 --> 00:00:41,670
we should have parachute deploy around

10
00:00:46,719 --> 00:00:49,910
the parachute is deployed

11
00:00:49,920 --> 00:00:53,510
we are decelerating

12
00:00:57,029 --> 00:00:55,350
has separated on the ground

13
00:01:01,910 --> 00:00:57,039

we're down to 90 meters per second at an

14

00:01:01,920 --> 00:01:08,230

standing by for bachelor separation

15

00:01:08,240 --> 00:01:15,429

we are in powered flight

16

00:01:19,350 --> 00:01:16,710

we're at altitude of one kilometer

17

00:01:36,950 --> 00:01:21,350

standing by for sky crane

18

00:01:36,960 --> 00:02:03,350

touchdown

19

00:02:03,360 --> 00:02:30,710

you got a thumbnail

20

00:02:34,229 --> 00:02:32,309

welcome to nasa's jet propulsion

21

00:02:35,990 --> 00:02:34,239

laboratory in pasadena california i

22

00:02:37,910 --> 00:02:36,000

think that video just brought a few

23

00:02:39,509 --> 00:02:37,920

tears to a few of the eyes up here on

24

00:02:41,270 --> 00:02:39,519

the podium let me introduce the

25

00:02:42,949 --> 00:02:41,280

panelists that we have today that are

26
00:02:45,030 --> 00:02:42,959
going to give us an update on the rover

27
00:02:47,430 --> 00:02:45,040
and a little bit of the outlook for what

28
00:02:48,470 --> 00:02:47,440
will come next um joining us right now

29
00:02:50,630 --> 00:02:48,480
we have

30
00:02:52,070 --> 00:02:50,640
michael watkins from jpl he's the

31
00:02:55,750 --> 00:02:52,080
mission manager for the mars science

32
00:03:03,750 --> 00:02:58,390
miguel san martin from jpl the chief

33
00:03:11,030 --> 00:03:06,229
sarah milkovich from jpl she's the

34
00:03:15,430 --> 00:03:13,270
and john grotzinger of caltech the

35
00:03:18,390 --> 00:03:15,440
project scientist for the mission and

36
00:03:19,750 --> 00:03:18,400
we'll begin with mike watkins okay good

37
00:03:21,830 --> 00:03:19,760
morning everyone

38
00:03:23,830 --> 00:03:21,840

welcome to mars or welcome back to mars

39

00:03:26,390 --> 00:03:23,840

if you were here last night

40

00:03:28,390 --> 00:03:26,400

the uh the surface mission of curiosity

41

00:03:30,390 --> 00:03:28,400

has now begun

42

00:03:31,990 --> 00:03:30,400

now for a long time those of us uh on

43

00:03:33,990 --> 00:03:32,000

the project and knew that we had to get

44

00:03:36,229 --> 00:03:34,000

through some big events launch was a big

45

00:03:38,149 --> 00:03:36,239

one for us and of course edl was an

46

00:03:40,470 --> 00:03:38,159

enormous one for us

47

00:03:42,710 --> 00:03:40,480

but you know we built this rover not

48

00:03:45,190 --> 00:03:42,720

just to be launched or not just to land

49

00:03:47,670 --> 00:03:45,200

on mars but to actually drive on mars

50

00:03:49,350 --> 00:03:47,680

and execute a very complex and beautiful

51
00:03:52,470 --> 00:03:49,360
science mission

52
00:03:54,869 --> 00:03:52,480
we have ended one phase of the mission

53
00:03:56,630 --> 00:03:54,879
much to our enjoyment and and to the to

54
00:03:59,110 --> 00:03:56,640
the joy of a lot of folks here in the

55
00:04:01,350 --> 00:03:59,120
audience and on our own team

56
00:04:02,789 --> 00:04:01,360
but another part has just begun

57
00:04:04,550 --> 00:04:02,799
and really the it's really the

58
00:04:06,149 --> 00:04:04,560
fundamental reason we built the rover

59
00:04:07,670 --> 00:04:06,159
it's really the purpose of the rover

60
00:04:09,750 --> 00:04:07,680
we're just starting that mission we're

61
00:04:13,030 --> 00:04:09,760
not we're not ending it

62
00:04:15,190 --> 00:04:13,040
now about two hours after uh landing um

63
00:04:16,310 --> 00:04:15,200

about just just before 1am in the

64

00:04:18,469 --> 00:04:16,320
morning

65

00:04:21,749 --> 00:04:18,479
curiosity called us

66

00:04:23,990 --> 00:04:21,759
via the next overpass of mars odyssey

67

00:04:25,990 --> 00:04:24,000
so mars odyssey

68

00:04:27,670 --> 00:04:26,000
was overhead during edl

69

00:04:30,150 --> 00:04:27,680
and of course it comes around two hours

70

00:04:32,710 --> 00:04:30,160
later mars has rotated a little bit

71

00:04:34,390 --> 00:04:32,720
and uh and uh was still over the horizon

72

00:04:37,510 --> 00:04:34,400
and we were able to have a short talk

73

00:04:39,749 --> 00:04:37,520
with with curiosity via mars odyssey

74

00:04:41,670 --> 00:04:39,759
and she told us that she is in surface

75

00:04:44,870 --> 00:04:41,680
nominal mode she correctly transitioned

76
00:04:46,870 --> 00:04:44,880
from from edl mode to surface nominal

77
00:04:48,710 --> 00:04:46,880
not in not in safe mode in regular

78
00:04:50,150 --> 00:04:48,720
nominal operational mode

79
00:04:52,390 --> 00:04:50,160
and is otherwise very healthy we had a

80
00:04:54,390 --> 00:04:52,400
very successful uhf pass we got some

81
00:04:57,189 --> 00:04:54,400
images that i'll show in a little bit

82
00:04:59,430 --> 00:04:57,199
and we are go for all planned sol one

83
00:05:03,909 --> 00:04:59,440
activities

84
00:05:06,629 --> 00:05:03,919
dominated by in some sense kind of

85
00:05:08,790 --> 00:05:06,639
boring activities uh checking out the

86
00:05:10,710 --> 00:05:08,800
rover making sure it's healthy

87
00:05:12,870 --> 00:05:10,720
deploying the antenna

88
00:05:16,550 --> 00:05:12,880

on saw two we deploy the remote sensing

89

00:05:17,909 --> 00:05:16,560

mast so the high gain antenna

90

00:05:19,430 --> 00:05:17,919

the rover looks kind of like this right

91

00:05:21,510 --> 00:05:19,440

now now you're used to seeing the rover

92

00:05:24,070 --> 00:05:21,520

like it is in that picture with its eyes

93

00:05:26,390 --> 00:05:24,080

up and with an antenna deployed in fact

94

00:05:28,629 --> 00:05:26,400

we are stowed down here with the with

95

00:05:30,790 --> 00:05:28,639

the with the remote sensing mass down

96

00:05:32,710 --> 00:05:30,800

and we're about to deploy this little

97

00:05:34,790 --> 00:05:32,720

antenna here this allows us to talk

98

00:05:36,550 --> 00:05:34,800

directly to the earth with enough gain

99

00:05:39,510 --> 00:05:36,560

that it can actually send data to us and

100

00:05:41,749 --> 00:05:39,520

be more easily talked to by us

101

00:05:43,189 --> 00:05:41,759

um later a day or so from now we're

102

00:05:45,110 --> 00:05:43,199

going we're then going to deploy the

103

00:05:46,629 --> 00:05:45,120

remote sensing mass so we can take these

104

00:05:48,150 --> 00:05:46,639

beautiful panoramas that we've all been

105

00:05:49,909 --> 00:05:48,160

waiting to see

106

00:05:50,870 --> 00:05:49,919

but as for now the first order of

107

00:05:52,870 --> 00:05:50,880

business is make sure that our

108

00:05:54,950 --> 00:05:52,880

communications to the earth are healthy

109

00:05:56,870 --> 00:05:54,960

and that's the prime activity for uh

110

00:05:59,430 --> 00:05:56,880

upcoming for today

111

00:06:01,430 --> 00:05:59,440

but last night we got one other um

112

00:06:04,550 --> 00:06:01,440

beautiful piece of information and that

113

00:06:08,230 --> 00:06:04,560

is a haz cam image now our haz cams we

114

00:06:09,749 --> 00:06:08,240

saw them um last night during during edl

115

00:06:11,670 --> 00:06:09,759

these are little cameras that point

116

00:06:14,150 --> 00:06:11,680

mostly at our wheels and at the ground

117

00:06:15,670 --> 00:06:14,160

in front of us in the front and the back

118

00:06:16,710 --> 00:06:15,680

and when we land we're concerned that

119

00:06:18,309 --> 00:06:16,720

they're going that we're going to kick

120

00:06:20,390 --> 00:06:18,319

up some dust right we're firing rockets

121

00:06:22,550 --> 00:06:20,400

and we might be throwing up a plume of

122

00:06:24,390 --> 00:06:22,560

dust and so we have little clear covers

123

00:06:26,629 --> 00:06:24,400

on them and those are the images that we

124

00:06:27,909 --> 00:06:26,639

got um last night at landing the very

125

00:06:29,189 --> 00:06:27,919

first things that we were clapping about

126

00:06:31,029 --> 00:06:29,199

in the in the control room so if you

127

00:06:32,550 --> 00:06:31,039

could show the first graphic

128

00:06:34,390 --> 00:06:32,560

this is that picture

129

00:06:36,070 --> 00:06:34,400

so now that we're all

130

00:06:37,909 --> 00:06:36,080

you know awake and we've digested this

131

00:06:39,430 --> 00:06:37,919

and we have a little bit less adrenaline

132

00:06:41,749 --> 00:06:39,440

that it's not such a great picture

133

00:06:43,830 --> 00:06:41,759

anymore right right it's beautiful it's

134

00:06:45,670 --> 00:06:43,840

beautiful to us right it's beautiful to

135

00:06:47,270 --> 00:06:45,680

us because of what it means but you can

136

00:06:48,550 --> 00:06:47,280

see uh there's a lot of stuff on the

137

00:06:50,469 --> 00:06:48,560

lens there

138

00:06:52,390 --> 00:06:50,479

and that is actually dust kicked up by

139

00:06:54,309 --> 00:06:52,400

by the landing event

140

00:06:55,430 --> 00:06:54,319

so we want to get rid of those covers uh

141

00:06:58,070 --> 00:06:55,440

you can see our beautiful shadow there

142

00:06:59,990 --> 00:06:58,080

and we and we uh we love that we hoped

143

00:07:01,830 --> 00:07:00,000

to get the rear

144

00:07:03,589 --> 00:07:01,840

and the front down this is a front haz

145

00:07:05,189 --> 00:07:03,599

cam the sun's behind us and you can see

146

00:07:07,189 --> 00:07:05,199

our shadow there

147

00:07:08,790 --> 00:07:07,199

um but let's go to the let's go to the

148

00:07:10,230 --> 00:07:08,800

next let's go to the animation and and

149

00:07:11,670 --> 00:07:10,240

show that remind you where these haz

150

00:07:13,990 --> 00:07:11,680

cams are and what you're about to see in

151
00:07:15,029 --> 00:07:14,000
the next image and uh and and the cover

152
00:07:16,629 --> 00:07:15,039
deploy

153
00:07:18,309 --> 00:07:16,639
right so they're so they're

154
00:07:20,070 --> 00:07:18,319
looking for mobility hazards right

155
00:07:21,430 --> 00:07:20,080
that's what we call them the haz cams so

156
00:07:22,469 --> 00:07:21,440
there they are kind of pointed at the

157
00:07:24,150 --> 00:07:22,479
ground

158
00:07:25,990 --> 00:07:24,160
and they have a wide field of view kind

159
00:07:27,749 --> 00:07:26,000
of a fisheye type lens okay that's the

160
00:07:29,589 --> 00:07:27,759
cover deploy right

161
00:07:31,909 --> 00:07:29,599
and and there and there are the cameras

162
00:07:32,790 --> 00:07:31,919
so let's go to the next image so last

163
00:07:34,309 --> 00:07:32,800

night

164

00:07:36,230 --> 00:07:34,319

after landing

165

00:07:38,070 --> 00:07:36,240

we fired all of our pyro's released

166

00:07:39,589 --> 00:07:38,080

these covers took these haz-cam images

167

00:07:41,830 --> 00:07:39,599

and these are the things that came down

168

00:07:43,749 --> 00:07:41,840

just before 1am right

169

00:07:46,070 --> 00:07:43,759

here here on the west coast

170

00:07:47,510 --> 00:07:46,080

okay so there there is our image

171

00:07:49,909 --> 00:07:47,520

and we're looking out the back you can

172

00:07:51,990 --> 00:07:49,919

see the the left rear wheel there you

173

00:07:53,350 --> 00:07:52,000

can see a little bit of of that hinge

174

00:07:54,710 --> 00:07:53,360

actually in the field of view there you

175

00:07:57,029 --> 00:07:54,720

see the kind of looks things like a

176

00:07:58,790 --> 00:07:57,039

spring there on the

177

00:08:00,550 --> 00:07:58,800

lower right side of the image

178

00:08:02,950 --> 00:08:00,560

and then on the upper left is part of

179

00:08:04,790 --> 00:08:02,960

the uh the rtg right the power source

180

00:08:06,309 --> 00:08:04,800

that's that's one of the radiator fins

181

00:08:07,430 --> 00:08:06,319

that were clip that we're seeing there

182

00:08:08,950 --> 00:08:07,440

on the side

183

00:08:11,189 --> 00:08:08,960

and uh several of the folks that worked

184

00:08:12,790 --> 00:08:11,199

on on assembling the rover and in atlo

185

00:08:13,990 --> 00:08:12,800

and test said they never got a picture

186

00:08:15,749 --> 00:08:14,000

this good they could never get the

187

00:08:16,629 --> 00:08:15,759

lighting quite right here on the earth

188

00:08:18,469 --> 00:08:16,639

and so

189

00:08:20,309 --> 00:08:18,479

so this is the definitive control image

190

00:08:21,830 --> 00:08:20,319

now of how the rover is supposed to look

191

00:08:23,430 --> 00:08:21,840

uh here on mars

192

00:08:25,350 --> 00:08:23,440

and uh over on the side there you're

193

00:08:27,510 --> 00:08:25,360

gonna see over on the right side you see

194

00:08:29,990 --> 00:08:27,520

some some hills there

195

00:08:31,830 --> 00:08:30,000

over on the on the far edge there and

196

00:08:33,829 --> 00:08:31,840

john grosser is going to show that later

197

00:08:36,070 --> 00:08:33,839

now i personally have to say i i really

198

00:08:37,750 --> 00:08:36,080

love these images because you know later

199

00:08:41,190 --> 00:08:37,760

we're going to get magnificent color

200

00:08:43,190 --> 00:08:41,200

panoramas and 3d images and and

201

00:08:45,030 --> 00:08:43,200

magnificent things on mars

202

00:08:47,670 --> 00:08:45,040

but these first images somehow are

203

00:08:49,350 --> 00:08:47,680

always the best ones to me because when

204

00:08:51,670 --> 00:08:49,360

you land on mars

205

00:08:53,509 --> 00:08:51,680

it's new every time

206

00:08:55,509 --> 00:08:53,519

and these you know this is a new place

207

00:08:57,110 --> 00:08:55,519

on mars you know we go on vacation to

208

00:08:58,870 --> 00:08:57,120

see a different part of the earth it's

209

00:09:00,790 --> 00:08:58,880

on our own planet and here we're seeing

210

00:09:02,150 --> 00:09:00,800

a part of mars we've never seen before

211

00:09:04,150 --> 00:09:02,160

and later you'll see a kind of a zoom in

212

00:09:06,949 --> 00:09:04,160

of that of this uh of this part of uh

213

00:09:08,710 --> 00:09:06,959

gail gail crater's rim here um

214

00:09:10,790 --> 00:09:08,720

and kind of reoriented so it looks more

215

00:09:12,550 --> 00:09:10,800

like like a landscape that we would

216

00:09:13,910 --> 00:09:12,560

recognize on the earth

217

00:09:16,150 --> 00:09:13,920

but we're going to continue to get the

218

00:09:18,389 --> 00:09:16,160

front of the front version of this with

219

00:09:19,990 --> 00:09:18,399

the shadow that we had yesterday out

220

00:09:21,750 --> 00:09:20,000

that same direction will be coming down

221

00:09:22,949 --> 00:09:21,760

later today

222

00:09:25,350 --> 00:09:22,959

and then over the next couple of days

223

00:09:27,030 --> 00:09:25,360

we'll be sending down the the hand lens

224

00:09:28,870 --> 00:09:27,040

imager which is which is in color and

225

00:09:31,430 --> 00:09:28,880

after we get the rsm up

226

00:09:34,150 --> 00:09:31,440

uh we will get some some nice uh black

227

00:09:35,990 --> 00:09:34,160

and white panoramas first

228

00:09:37,829 --> 00:09:36,000

now this is our new home at least for a

229

00:09:39,670 --> 00:09:37,839

while here on gale and we need to

230

00:09:41,430 --> 00:09:39,680

explore it and take a look around and

231

00:09:43,590 --> 00:09:41,440

then of course eventually um head for

232

00:09:45,590 --> 00:09:43,600

the hills now we actually hope in the

233

00:09:47,190 --> 00:09:45,600

front haz cam that should be coming down

234

00:09:49,269 --> 00:09:47,200

in a few hours from here we can actually

235

00:09:50,949 --> 00:09:49,279

see the mountain of gale

236

00:09:54,150 --> 00:09:50,959

we think we're pointed kind of east

237

00:09:56,470 --> 00:09:54,160

southeast about 112 degrees heading

238

00:09:58,790 --> 00:09:56,480

we're at a very slight tilt we are in

239

00:09:59,750 --> 00:09:58,800

fact let me look at it here we are 3.6

240

00:10:01,670 --> 00:09:59,760

degrees

241

00:10:03,350 --> 00:10:01,680

negative in pitch so the front is down

242

00:10:05,110 --> 00:10:03,360

by about 3 degrees

243

00:10:06,069 --> 00:10:05,120

and we are left side down about two

244

00:10:07,750 --> 00:10:06,079

degrees

245

00:10:10,389 --> 00:10:07,760

now those are pretty small numbers we

246

00:10:13,030 --> 00:10:10,399

landed pretty much on this table right

247

00:10:15,750 --> 00:10:13,040

here it's pretty it's pretty flat

248

00:10:16,949 --> 00:10:15,760

uh we're in a pretty good spot here

249

00:10:19,670 --> 00:10:16,959

but there's still the question where

250

00:10:20,790 --> 00:10:19,680

exactly is this spot on our maps of mars

251
00:10:23,590 --> 00:10:20,800
and to talk a little bit about that we

252
00:10:24,550 --> 00:10:23,600
have miguel san martin thank you mike

253
00:10:27,030 --> 00:10:24,560
so

254
00:10:28,069 --> 00:10:27,040
good morning um i hope you have enjoyed

255
00:10:33,030 --> 00:10:28,079
the

256
00:10:34,870 --> 00:10:33,040
i sure did actually i'm i want to get

257
00:10:35,910 --> 00:10:34,880
another round

258
00:10:37,829 --> 00:10:35,920
and um

259
00:10:38,949 --> 00:10:37,839
uh maybe they have to wait a few few

260
00:10:41,670 --> 00:10:38,959
more years

261
00:10:44,790 --> 00:10:41,680
and uh so

262
00:10:46,630 --> 00:10:44,800
the uh edl what looked beautiful from

263
00:10:48,630 --> 00:10:46,640

from our monitors of course we haven't

264

00:10:50,630 --> 00:10:48,640

had the time to look the data carefully

265

00:10:51,430 --> 00:10:50,640

and the data is going to be coming

266

00:10:54,230 --> 00:10:51,440

uh

267

00:10:56,310 --> 00:10:54,240

soon i mean the the right now the rover

268

00:10:58,790 --> 00:10:56,320

is full of edl

269

00:11:01,110 --> 00:10:58,800

the threshold through of edl data that

270

00:11:03,269 --> 00:11:01,120

is going to help us when we download it

271

00:11:05,430 --> 00:11:03,279

understand and bring our knowledge of

272

00:11:08,310 --> 00:11:05,440

edl to even higher levels which is we

273

00:11:09,990 --> 00:11:08,320

are very excited right now the edl team

274

00:11:10,870 --> 00:11:10,000

waiting for that data

275

00:11:12,870 --> 00:11:10,880

so

276

00:11:15,910 --> 00:11:12,880

i'm going to talk to you about our best

277

00:11:18,389 --> 00:11:15,920

knowledge right now of where we landed

278

00:11:20,870 --> 00:11:18,399

okay it's not that might change when we

279

00:11:24,550 --> 00:11:20,880

get high-rise data but this is what we

280

00:11:26,710 --> 00:11:24,560

know the the best at this point so uh

281

00:11:28,550 --> 00:11:26,720

next picture i don't know

282

00:11:31,430 --> 00:11:28,560

okay where uh

283

00:11:33,269 --> 00:11:31,440

we did land inside the crater so

284

00:11:35,430 --> 00:11:33,279

we know that

285

00:11:37,269 --> 00:11:35,440

and uh you can see there the uh our

286

00:11:40,470 --> 00:11:37,279

landing ellipse 20 kilometers by seven

287

00:11:44,710 --> 00:11:40,480

kilometers and uh and uh so we can if we

288

00:11:46,870 --> 00:11:44,720

can get the next uh picture please

289

00:11:49,670 --> 00:11:46,880

and there's the dot or where we think we

290

00:11:51,750 --> 00:11:49,680

landed this is two kilometers uh east of

291

00:11:52,629 --> 00:11:51,760

the landing of the center of the landing

292

00:11:55,990 --> 00:11:52,639

site

293

00:11:57,910 --> 00:11:56,000

uh of the aim point and about uh it's a

294

00:11:59,990 --> 00:11:57,920

few hundred meters north now let me

295

00:12:01,990 --> 00:12:00,000

explain to you where we get that that

296

00:12:04,550 --> 00:12:02,000

that estimate from okay

297

00:12:06,150 --> 00:12:04,560

uh this estimate is based on

298

00:12:08,629 --> 00:12:06,160

uh ground

299

00:12:10,629 --> 00:12:08,639

uh navigation the navigation down here

300

00:12:13,190 --> 00:12:10,639

on the ground by the navigation team

301
00:12:13,910 --> 00:12:13,200
that thomas martin murders

302
00:12:15,190 --> 00:12:13,920
and

303
00:12:17,750 --> 00:12:15,200
leads that

304
00:12:19,750 --> 00:12:17,760
as you saw yesterday gave us tremendous

305
00:12:21,030 --> 00:12:19,760
incredible precision in navigation that

306
00:12:24,069 --> 00:12:21,040
we seeded

307
00:12:25,110 --> 00:12:24,079
the the navigation software of curiosity

308
00:12:27,269 --> 00:12:25,120
with that

309
00:12:29,430 --> 00:12:27,279
very precise data and then curiosity

310
00:12:31,509 --> 00:12:29,440
uses using its own navigation

311
00:12:33,190 --> 00:12:31,519
instruments in particular

312
00:12:35,030 --> 00:12:33,200
what we call an inertial measurement

313
00:12:37,350 --> 00:12:35,040

unit which is a

314

00:12:38,550 --> 00:12:37,360

it's a relative instrument that can take

315

00:12:40,870 --> 00:12:38,560

an initial

316

00:12:44,870 --> 00:12:42,949

seed of what the position of velocity is

317

00:12:46,470 --> 00:12:44,880

and it can propagate forward

318

00:12:47,670 --> 00:12:46,480

as it measures all the forces being

319

00:12:50,550 --> 00:12:47,680

applied to the spacecraft by the

320

00:12:52,470 --> 00:12:50,560

atmosphere and its own rockets

321

00:12:55,509 --> 00:12:52,480

so it can but but it is kind of a dead

322

00:12:57,910 --> 00:12:55,519

reckoning so it's kind of uh kind of

323

00:12:59,910 --> 00:12:57,920

like the odometer in a car counting

324

00:13:03,269 --> 00:12:59,920

wheels okay so this it tends to

325

00:13:04,829 --> 00:13:03,279

accumulate error okay so um

326

00:13:08,389 --> 00:13:04,839

but

327

00:13:10,870 --> 00:13:08,399

that's so this in essence that point is

328

00:13:12,310 --> 00:13:10,880

based on the one of the last evrs the

329

00:13:14,150 --> 00:13:12,320

last piece of telemetry that the

330

00:13:16,629 --> 00:13:14,160

spacecraft told us when he touched down

331

00:13:18,310 --> 00:13:16,639

says i touched down and this is where we

332

00:13:19,350 --> 00:13:18,320

are very confident the spacecraft tells

333

00:13:21,509 --> 00:13:19,360

you that

334

00:13:23,670 --> 00:13:21,519

and then uh obviously we need to analyze

335

00:13:25,670 --> 00:13:23,680

it and and that's the point with some

336

00:13:28,550 --> 00:13:25,680

corrections that we did with our friends

337

00:13:30,710 --> 00:13:28,560

at langley uh based on

338

00:13:33,030 --> 00:13:30,720

some technicalities that probably uh we

339

00:13:36,310 --> 00:13:33,040

shouldn't get into

340

00:13:39,189 --> 00:13:36,320

so uh but i you know we we actually

341

00:13:40,790 --> 00:13:39,199

get other indications from from the data

342

00:13:42,150 --> 00:13:40,800

that we saw in the telemetry that gives

343

00:13:45,189 --> 00:13:42,160

us the impression that we actually did

344

00:13:47,430 --> 00:13:45,199

very well like for example one sanity

345

00:13:48,389 --> 00:13:47,440

check that we do is that eventually

346

00:13:50,230 --> 00:13:48,399

after

347

00:13:52,949 --> 00:13:50,240

propagating

348

00:13:53,750 --> 00:13:52,959

with the inertial measurement unit

349

00:13:58,230 --> 00:13:53,760

for

350

00:13:59,750 --> 00:13:58,240

eventually we remove the the heat shield

351
00:14:00,710 --> 00:13:59,760
and the radar starts looking at the

352
00:14:03,110 --> 00:14:00,720
ground

353
00:14:05,350 --> 00:14:03,120
and now we can see how well in some

354
00:14:08,870 --> 00:14:05,360
aspects the inertial measurement unit

355
00:14:10,150 --> 00:14:08,880
did and how well thomas thomas did okay

356
00:14:12,389 --> 00:14:10,160
because it gives us altitude and

357
00:14:13,590 --> 00:14:12,399
velocity relative to the ground

358
00:14:15,509 --> 00:14:13,600
and actually

359
00:14:17,670 --> 00:14:15,519
they agree tremendously well is with it

360
00:14:19,189 --> 00:14:17,680
i mean it's just so well that it's we

361
00:14:20,790 --> 00:14:19,199
have to look at the data again because

362
00:14:23,110 --> 00:14:20,800
it's hard to believe we haven't been

363
00:14:25,509 --> 00:14:23,120

able to get our simulations to work that

364

00:14:28,150 --> 00:14:25,519

well and i'm not and i'm seriously

365

00:14:30,710 --> 00:14:28,160

yeah it was a correction of a few meters

366

00:14:33,350 --> 00:14:30,720

in altitude and in velocity less than a

367

00:14:34,230 --> 00:14:33,360

meter per second okay and by the way and

368

00:14:39,750 --> 00:14:34,240

that

369

00:14:42,230 --> 00:14:39,760

we did how good was our last attitude

370

00:14:43,189 --> 00:14:42,240

fix based on the stars okay just like

371

00:14:45,829 --> 00:14:43,199

the old

372

00:14:47,509 --> 00:14:45,839

uh sailors did we still use the stars

373

00:14:49,750 --> 00:14:47,519

and i think that's great i mean it

374

00:14:51,910 --> 00:14:49,760

connects us with the past so we did the

375

00:14:55,269 --> 00:14:51,920

final looks at the stars we figure out

376

00:14:57,590 --> 00:14:55,279

the curiosity did that all on itself

377

00:14:59,750 --> 00:14:57,600

looked at the stars took the navigation

378

00:15:02,150 --> 00:14:59,760

data from the ground and then he took it

379

00:15:03,990 --> 00:15:02,160

all the way down and uh and guided the

380

00:15:05,750 --> 00:15:04,000

spacecraft and and that's the best

381

00:15:08,230 --> 00:15:05,760

knowledge of where we are

382

00:15:10,870 --> 00:15:08,240

uh we think that within a kilometer is

383

00:15:13,750 --> 00:15:10,880

our estimate uh

384

00:15:15,670 --> 00:15:13,760

but um

385

00:15:18,550 --> 00:15:15,680

you know we have to wait for precise

386

00:15:20,710 --> 00:15:18,560

localization by high rise so

387

00:15:21,430 --> 00:15:20,720

that's that's all i have to say thank

388

00:15:23,590 --> 00:15:21,440

you

389

00:15:26,870 --> 00:15:23,600

sarah

390

00:15:28,230 --> 00:15:26,880

so speaking of high-rise um

391

00:15:31,829 --> 00:15:28,240

we heard a lot we've heard you've heard

392

00:15:34,389 --> 00:15:31,839

a lot about how odyssey was listening to

393

00:15:36,230 --> 00:15:34,399

msl as it came in for landing but

394

00:15:37,430 --> 00:15:36,240

odyssey wasn't the only orbiter there

395

00:15:39,509 --> 00:15:37,440

listening

396

00:15:41,110 --> 00:15:39,519

mars reconnaissance orbiter was also

397

00:15:43,189 --> 00:15:41,120

there and

398

00:15:46,629 --> 00:15:43,199

mro wasn't just listening we were

399

00:15:49,670 --> 00:15:46,639

watching so the high-rise camera is one

400

00:15:51,430 --> 00:15:49,680

of the cameras on mro and we normally

401
00:15:54,550 --> 00:15:51,440
take pictures of the surface and we can

402
00:15:56,790 --> 00:15:54,560
get pictures up to resolutions of 30

403
00:16:00,550 --> 00:15:56,800
centimeters per pixel which is just

404
00:16:04,069 --> 00:16:00,560
really fantastic but um what we did this

405
00:16:06,870 --> 00:16:04,079
time if you can go to the graphic

406
00:16:10,230 --> 00:16:06,880
there's mro coming along and we actually

407
00:16:12,230 --> 00:16:10,240
took a picture with highrise as msl came

408
00:16:14,470 --> 00:16:12,240
in on the parachute so you can see the

409
00:16:17,110 --> 00:16:14,480
little dot there is msl moving across

410
00:16:19,670 --> 00:16:17,120
the box shows our image there's the

411
00:16:21,030 --> 00:16:19,680
parachute

412
00:16:23,350 --> 00:16:21,040
and

413
00:16:37,590 --> 00:16:23,360

if we zoom in

414

00:16:41,430 --> 00:16:38,550

so i

415

00:16:43,829 --> 00:16:41,440

and this is really a testament to uh the

416

00:16:45,509 --> 00:16:43,839

the high-rise team uh alfred mcewen the

417

00:16:47,910 --> 00:16:45,519

principal investigator and the highrise

418

00:16:50,629 --> 00:16:47,920

operations team at university of arizona

419

00:16:52,310 --> 00:16:50,639

and the mro spacecraft team

420

00:16:53,990 --> 00:16:52,320

this was really

421

00:16:56,310 --> 00:16:54,000

we've been working on putting this

422

00:16:58,230 --> 00:16:56,320

imaging sequence together since about

423

00:17:00,470 --> 00:16:58,240

march we've been tweaking it and

424

00:17:02,230 --> 00:17:00,480

updating it as msl has been getting

425

00:17:05,429 --> 00:17:02,240

closer and closer to mars but the final

426
00:17:06,630 --> 00:17:05,439
commands were sent up a couple days ago

427
00:17:09,590 --> 00:17:06,640
and

428
00:17:11,669 --> 00:17:09,600
this image was taken six minutes after

429
00:17:12,870 --> 00:17:11,679
msl entered the

430
00:17:17,510 --> 00:17:12,880
atmosphere

431
00:17:19,750 --> 00:17:17,520
and mro was about 340 kilometers away

432
00:17:20,789 --> 00:17:19,760
from msl at the time the picture was

433
00:17:22,150 --> 00:17:20,799
taken

434
00:17:29,350 --> 00:17:22,160
you can see

435
00:17:30,950 --> 00:17:29,360
the the hole in the top there um the

436
00:17:33,590 --> 00:17:30,960
that inset image

437
00:17:35,590 --> 00:17:33,600
is been stretched different differently

438
00:17:37,990 --> 00:17:35,600

so that you can see

439

00:17:42,070 --> 00:17:38,000

the um you can see the parachute clearly

440

00:17:46,070 --> 00:17:44,390

and let's see if we go i think that's i

441

00:17:48,230 --> 00:17:46,080

think that's the last one or we can go

442

00:17:51,350 --> 00:17:48,240

to the last one

443

00:17:55,270 --> 00:17:51,360

so yes so this is we have taken highrise

444

00:17:57,590 --> 00:17:55,280

has taken over 120 pictures of gale as

445

00:18:00,070 --> 00:17:57,600

part of the landing site selection and

446

00:18:02,630 --> 00:18:00,080

characterization process but i really

447

00:18:05,029 --> 00:18:02,640

think this is the coolest one

448

00:18:06,789 --> 00:18:05,039

so um and so now

449

00:18:07,990 --> 00:18:06,799

john is going to talk about what we see

450

00:18:09,110 --> 00:18:08,000

on the surface

451

00:18:11,510 --> 00:18:09,120

thanks sarah

452

00:18:13,909 --> 00:18:11,520

okay so um let's just go to the first

453

00:18:16,470 --> 00:18:13,919

graphic right away please and get you

454

00:18:18,630 --> 00:18:16,480

back into the has cams

455

00:18:21,990 --> 00:18:18,640

tell you a little bit about that uh

456

00:18:24,870 --> 00:18:22,000

here's a image our sort of standard uh

457

00:18:29,029 --> 00:18:24,880

color viking era color superimposed on

458

00:18:31,750 --> 00:18:29,039

top of a ctx dem and showing the

459

00:18:33,590 --> 00:18:31,760

topography of gale crater

460

00:18:35,830 --> 00:18:33,600

you can see the well-defined crater rim

461

00:18:37,909 --> 00:18:35,840

there the landing ellipse and uh and

462

00:18:39,909 --> 00:18:37,919

mount sharp towards the middle

463

00:18:41,990 --> 00:18:39,919

and to help you understand what we're

464

00:18:42,950 --> 00:18:42,000

going to be seeing in the in the haz

465

00:18:45,110 --> 00:18:42,960

cams

466

00:18:47,830 --> 00:18:45,120

let's just get oriented a little bit

467

00:18:50,830 --> 00:18:47,840

so north is up here towards the top of

468

00:18:53,909 --> 00:18:50,840

the image and therefore if you go

469

00:18:56,950 --> 00:18:53,919

counterclockwise that takes you in into

470

00:18:58,470 --> 00:18:56,960

the the northwest uh quadrant

471

00:19:01,430 --> 00:18:58,480

and uh

472

00:19:03,190 --> 00:19:01,440

uh and there you see the rim so

473

00:19:04,950 --> 00:19:03,200

uh the northern rim

474

00:19:07,430 --> 00:19:04,960

of of gale crater is actually

475

00:19:10,390 --> 00:19:07,440

considerably lower in elevation than the

476
00:19:12,230 --> 00:19:10,400
than the summit of of mount sharp and

477
00:19:14,230 --> 00:19:12,240
you can even see where the

478
00:19:15,190 --> 00:19:14,240
the rim is is breached a little bit

479
00:19:16,070 --> 00:19:15,200
there

480
00:19:17,909 --> 00:19:16,080
and

481
00:19:19,110 --> 00:19:17,919
but remember the topography remember the

482
00:19:20,789 --> 00:19:19,120
topography of the rim you're gonna have

483
00:19:24,070 --> 00:19:20,799
to keep that in mind

484
00:19:26,789 --> 00:19:24,080
and uh and then mount sharp itself

485
00:19:27,909 --> 00:19:26,799
is also going to represent a topographic

486
00:19:29,669 --> 00:19:27,919
rise

487
00:19:32,710 --> 00:19:29,679
and as mike mentioned

488
00:19:35,990 --> 00:19:32,720

before the spacecraft is oriented

489

00:19:39,669 --> 00:19:36,000

northwest southeast pointing forward

490

00:19:41,430 --> 00:19:39,679

towards mount sharp and uh so if we go

491

00:19:44,150 --> 00:19:41,440

to the next image

492

00:19:46,789 --> 00:19:44,160

this is really spectacular uh what's

493

00:19:49,830 --> 00:19:46,799

happened here is uh justin mackey and

494

00:19:51,990 --> 00:19:49,840

bob dean worked to take the the has cam

495

00:19:54,789 --> 00:19:52,000

image remember this camera has a fisheye

496

00:19:56,549 --> 00:19:54,799

lens so there's a lot of distortion uh

497

00:19:57,750 --> 00:19:56,559

due to the curve extreme curvature of

498

00:19:59,909 --> 00:19:57,760

the lens

499

00:20:01,669 --> 00:19:59,919

and by restoring that you go back to the

500

00:20:03,750 --> 00:20:01,679

horizontal here so this would be the

501
00:20:06,470 --> 00:20:03,760
view that you saw you would see if you

502
00:20:09,190 --> 00:20:06,480
were a haz cam on the surface of mars

503
00:20:11,430 --> 00:20:09,200
and there we are looking rear has cam

504
00:20:13,270 --> 00:20:11,440
towards the rim of gale crater

505
00:20:15,270 --> 00:20:13,280
and uh and this couldn't have been a

506
00:20:17,590 --> 00:20:15,280
better position to land in

507
00:20:19,350 --> 00:20:17,600
because we get to see rearwards and

508
00:20:20,870 --> 00:20:19,360
forwards and in this view you see the

509
00:20:23,590 --> 00:20:20,880
rim of the gale crater you've heard us

510
00:20:25,750 --> 00:20:23,600
speaking about the alluvial fan

511
00:20:28,390 --> 00:20:25,760
that we think we've landed very close to

512
00:20:30,789 --> 00:20:28,400
the end of and this is the source area

513
00:20:33,510 --> 00:20:30,799

so this is bringing materials in from

514

00:20:35,110 --> 00:20:33,520

the rim which is not our destination

515

00:20:36,630 --> 00:20:35,120

uh but we're getting a free sample

516

00:20:38,230 --> 00:20:36,640

without having to drive over there

517

00:20:40,390 --> 00:20:38,240

potentially if we're able to drive the

518

00:20:43,029 --> 00:20:40,400

rover and and discover the right kind of

519

00:20:45,909 --> 00:20:43,039

geology that really could represent uh

520

00:20:48,390 --> 00:20:45,919

the distal part of this alluvial fan

521

00:20:50,230 --> 00:20:48,400

and in the foreground you see a scene

522

00:20:52,470 --> 00:20:50,240

that's that's very familiar to you from

523

00:20:55,590 --> 00:20:52,480

other images of mars uh what is

524

00:20:57,750 --> 00:20:55,600

undoubtedly a wind-swept plane uh with

525

00:20:59,909 --> 00:20:57,760

coarse fragments left behind the science

526

00:21:01,830 --> 00:20:59,919

team is initially impressed by

527

00:21:04,549 --> 00:21:01,840

the rather uniform grain size

528

00:21:07,190 --> 00:21:04,559

distribution of the coarser particles

529

00:21:09,909 --> 00:21:07,200

uh we don't yet know what uh what that

530

00:21:11,669 --> 00:21:09,919

uh what that diameter is but you can get

531

00:21:13,510 --> 00:21:11,679

the sense qualitatively that there's a

532

00:21:17,750 --> 00:21:13,520

bunch of particles there that are about

533

00:21:19,430 --> 00:21:17,760

the about the same size so in the in the

534

00:21:21,350 --> 00:21:19,440

upcoming saul's we're going to be

535

00:21:23,270 --> 00:21:21,360

debating this and discussing it and

536

00:21:24,789 --> 00:21:23,280

trying to figure out uh where to go on

537

00:21:26,070 --> 00:21:24,799

what to do but this will be part of the

538

00:21:27,990 --> 00:21:26,080

story

539

00:21:29,669 --> 00:21:28,000

a target like this is interesting

540

00:21:31,350 --> 00:21:29,679

scientifically because one of the things

541

00:21:33,669 --> 00:21:31,360

that we're going to want to do after the

542

00:21:36,549 --> 00:21:33,679

commissioning period is over is scoop up

543

00:21:38,390 --> 00:21:36,559

some of the soil and analyze it and what

544

00:21:39,510 --> 00:21:38,400

we would really like to do is analyze

545

00:21:41,669 --> 00:21:39,520

something that we feel is very

546

00:21:44,230 --> 00:21:41,679

representative of mars so something like

547

00:21:47,190 --> 00:21:44,240

this is potentially a target for us to

548

00:21:49,830 --> 00:21:47,200

think about and by sampling it and and

549

00:21:52,390 --> 00:21:49,840

measuring it uh we then have a sample of

550

00:21:55,590 --> 00:21:52,400

what could be the most global uh sample

551
00:21:58,390 --> 00:21:55,600
of mars that uh we could measure

552
00:22:01,270 --> 00:21:58,400
okay now in the next one this one's

553
00:22:03,029 --> 00:22:01,280
tough okay this one uh i think the edl

554
00:22:04,789 --> 00:22:03,039
guys were probably seeing a vision like

555
00:22:07,029 --> 00:22:04,799
this a few hours ago

556
00:22:09,270 --> 00:22:07,039
but uh what you can see now again

557
00:22:11,990 --> 00:22:09,280
remember the curvature is taken out

558
00:22:14,230 --> 00:22:12,000
we are looking towards the southeast uh

559
00:22:15,830 --> 00:22:14,240
you've got the shadow of the rover there

560
00:22:17,830 --> 00:22:15,840
and this was the first indication that

561
00:22:20,310 --> 00:22:17,840
we were looking southeast because the

562
00:22:21,430 --> 00:22:20,320
the sun was setting behind us

563
00:22:23,669 --> 00:22:21,440

and

564

00:22:25,669 --> 00:22:23,679

uh gosh i just realized i forgot to

565

00:22:28,310 --> 00:22:25,679

point something up this is important is

566

00:22:36,310 --> 00:22:28,320

it possible to go backwards

567

00:22:39,830 --> 00:22:38,390

one more please there we go okay so look

568

00:22:42,710 --> 00:22:39,840

at the landing ellipse if you go to the

569

00:22:44,310 --> 00:22:42,720

southwest part notice that black line

570

00:22:46,470 --> 00:22:44,320

that that goes from northeast to

571

00:22:49,830 --> 00:22:46,480

southwest through that that's this dune

572

00:22:50,950 --> 00:22:49,840

field which lies at the base of of mount

573

00:22:53,350 --> 00:22:50,960

sharp there

574

00:22:54,630 --> 00:22:53,360

uh we this is beautiful and all the

575

00:22:55,669 --> 00:22:54,640

high-rise images that have been

576

00:22:57,270 --> 00:22:55,679

collected

577

00:22:59,909 --> 00:22:57,280

and so that black line is going to be

578

00:23:02,230 --> 00:22:59,919

our frame of reference and and as miguel

579

00:23:04,710 --> 00:23:02,240

showed we have landed somewhere to the

580

00:23:06,470 --> 00:23:04,720

north of that black line in the ellipse

581

00:23:08,549 --> 00:23:06,480

and in the haz cam image we're looking

582

00:23:11,190 --> 00:23:08,559

towards the base of mount sharp so now

583

00:23:13,750 --> 00:23:11,200

let's advance two again there we are

584

00:23:15,510 --> 00:23:13,760

right on the money that black line about

585

00:23:18,149 --> 00:23:15,520

three quarters of the way up there we

586

00:23:21,350 --> 00:23:18,159

believe is the dune field that black

587

00:23:22,470 --> 00:23:21,360

line of dunes and therefore as you work

588

00:23:24,870 --> 00:23:22,480

upwards

589

00:23:26,630 --> 00:23:24,880

in the image very fuzzy in there we

590

00:23:29,669 --> 00:23:26,640

believe you see the outline of mount

591

00:23:31,669 --> 00:23:29,679

sharp itself bright in the setting sun

592

00:23:33,430 --> 00:23:31,679

and and the upper part then is the

593

00:23:35,830 --> 00:23:33,440

horizon in the sky which would look

594

00:23:38,470 --> 00:23:35,840

darker so you should see a slope which

595

00:23:41,029 --> 00:23:38,480

goes from above that that black line of

596

00:23:43,750 --> 00:23:41,039

dunes sloping to the upper right and

597

00:23:45,990 --> 00:23:43,760

separating light below from dark above

598

00:23:48,149 --> 00:23:46,000

and we believe that's the silhouette of

599

00:23:50,070 --> 00:23:48,159

of mount sharp and the setting sun

600

00:23:51,909 --> 00:23:50,080

so you have a little bit of adventure

601
00:23:54,390 --> 00:23:51,919
before you i'll be sleeping when the

602
00:23:56,390 --> 00:23:54,400
next downlink occurs and uh

603
00:23:58,390 --> 00:23:56,400
uh joy crisp will be able to talk to you

604
00:24:00,390 --> 00:23:58,400
about the the the data that will get

605
00:24:02,549 --> 00:24:00,400
down that will be without the dust cover

606
00:24:05,029 --> 00:24:02,559
and uh and higher resolution possibly

607
00:24:07,110 --> 00:24:05,039
even full frame to confirm this but we

608
00:24:09,590 --> 00:24:07,120
think we've landed and the haz cams are

609
00:24:12,390 --> 00:24:09,600
picking up the topography on on opposing

610
00:24:13,909 --> 00:24:12,400
sides of our landing ellipse

611
00:24:15,669 --> 00:24:13,919
so that's it for me

612
00:24:17,590 --> 00:24:15,679
okay that means we'll open it up to

613
00:24:19,669 --> 00:24:17,600

questions now and we'll get a microphone

614

00:24:21,190 --> 00:24:19,679

to you and i am going to try to memorize

615

00:24:22,549 --> 00:24:21,200

the order in which i see hands come up

616

00:24:24,630 --> 00:24:22,559

and we'll start over here on this side

617

00:24:26,710 --> 00:24:24,640

and work our way over thank you really

618

00:24:28,549 --> 00:24:26,720

kelly beatty sky and telescope uh mike

619

00:24:29,750 --> 00:24:28,559

could you refine the landing time as

620

00:24:31,830 --> 00:24:29,760

best you know it for us i was a little

621

00:24:33,470 --> 00:24:31,840

confused by a time stamp in miguel's

622

00:24:35,430 --> 00:24:33,480

image which said

623

00:24:37,269 --> 00:24:35,440

22-38-50 so

624

00:24:39,990 --> 00:24:37,279

uh what was the landing time as best you

625

00:24:44,230 --> 00:24:40,000

know um i will actually have to get that

626

00:24:48,149 --> 00:24:46,390

no no no no we'll get it we'll get it

627

00:24:53,830 --> 00:24:48,159

for you rob do you know

628

00:25:00,070 --> 00:24:57,430

scott gold at the los angeles times um

629

00:25:02,149 --> 00:25:00,080

can you explain what's just south of the

630

00:25:04,149 --> 00:25:02,159

of the landing site it looks like that

631

00:25:07,190 --> 00:25:04,159

might be the dune area that you've been

632

00:25:08,070 --> 00:25:07,200

talking about and also in in lay terms

633

00:25:10,549 --> 00:25:08,080

how

634

00:25:13,669 --> 00:25:10,559

far are you from what you might consider

635

00:25:16,230 --> 00:25:13,679

to be the foothills of mount sharp

636

00:25:19,110 --> 00:25:16,240

john you want to talk about the dunes uh

637

00:25:21,269 --> 00:25:19,120

sure um the uh you know the dunes that

638

00:25:22,230 --> 00:25:21,279

you see there is uh is a rather narrow

639

00:25:24,870 --> 00:25:22,240

strip

640

00:25:26,950 --> 00:25:24,880

and uh you see it slicing there through

641

00:25:29,990 --> 00:25:26,960

the the southwest part of the landing

642

00:25:32,230 --> 00:25:30,000

ellipse and and so from where we think

643

00:25:34,710 --> 00:25:32,240

we've landed to those dunes is is a

644

00:25:38,070 --> 00:25:34,720

matter of kilometers a few kilometers

645

00:25:40,710 --> 00:25:38,080

away the the basal topography uh where

646

00:25:42,710 --> 00:25:40,720

it really starts to steepen up there

647

00:25:45,590 --> 00:25:42,720

where we would like to access it could

648

00:25:48,070 --> 00:25:45,600

be as much as as 10 kilometers away but

649

00:25:49,350 --> 00:25:48,080

if as the cl as the crow flies directly

650

00:25:51,029 --> 00:25:49,360

towards it would be a much shorter

651
00:25:53,029 --> 00:25:51,039
distance because of that angle that you

652
00:25:56,230 --> 00:25:53,039
see there slicing through the

653
00:25:57,909 --> 00:25:56,240
through the landing ellipse

654
00:26:00,549 --> 00:25:57,919
oh then hand back the mic please thank

655
00:26:01,990 --> 00:26:00,559
you so does that mean that uh to

656
00:26:03,990 --> 00:26:02,000
eventually get to the mountain you would

657
00:26:05,830 --> 00:26:04,000
go north and around the dunes or are

658
00:26:08,470 --> 00:26:05,840
there uh is there anything is there any

659
00:26:09,430 --> 00:26:08,480
reason you can't essentially go straight

660
00:26:11,269 --> 00:26:09,440
um

661
00:26:12,789 --> 00:26:11,279
well it would it uh

662
00:26:14,549 --> 00:26:12,799
you know we would never want to just

663
00:26:16,470 --> 00:26:14,559

drive across the dunes as the the

664

00:26:18,070 --> 00:26:16,480

shortest way to go there we have been

665

00:26:19,830 --> 00:26:18,080

studying them we have this beautiful

666

00:26:22,789 --> 00:26:19,840

topography because of the high-rise

667

00:26:24,789 --> 00:26:22,799

camera and and you know meter scale

668

00:26:26,630 --> 00:26:24,799

uh digital elevation models and so we

669

00:26:28,870 --> 00:26:26,640

study those to find the paths that would

670

00:26:30,149 --> 00:26:28,880

give us the least resistance through it

671

00:26:31,510 --> 00:26:30,159

but really what's going to happen first

672

00:26:33,510 --> 00:26:31,520

is the science team is going to look at

673

00:26:35,750 --> 00:26:33,520

the geology of the landing ellipse as a

674

00:26:37,990 --> 00:26:35,760

whole and then try to find a root and if

675

00:26:39,669 --> 00:26:38,000

it's a more circuitous route if the

676

00:26:42,310 --> 00:26:39,679

science justifies it we will happily

677

00:26:44,230 --> 00:26:42,320

take that route

678

00:26:46,950 --> 00:26:44,240

okay we're going over on this side

679

00:26:48,950 --> 00:26:46,960

right there and we'll go to your next

680

00:26:50,710 --> 00:26:48,960

sorry ian thompson from the register can

681

00:26:52,789 --> 00:26:50,720

you tell me what's actually happened to

682

00:26:53,430 --> 00:26:52,799

the lander which lowered curiosity down

683

00:26:58,470 --> 00:26:53,440

it

684

00:27:00,470 --> 00:26:58,480

direction have you got any information

685

00:27:03,350 --> 00:27:00,480

how far is it how far away it is what

686

00:27:04,789 --> 00:27:03,360

kind of condition it's in

687

00:27:07,190 --> 00:27:04,799

where do i take that

688

00:27:10,390 --> 00:27:07,200

well it's it's it flies away it has

689

00:27:12,149 --> 00:27:10,400

actually a a close-loop algorithm it you

690

00:27:13,269 --> 00:27:12,159

know very rudimentary it doesn't need to

691

00:27:15,350 --> 00:27:13,279

be very

692

00:27:19,110 --> 00:27:15,360

sophisticated because we only we want to

693

00:27:20,789 --> 00:27:19,120

crash it far away 400 meters away and we

694

00:27:21,590 --> 00:27:20,799

we do tell it a heading

695

00:27:23,830 --> 00:27:21,600

okay

696

00:27:25,830 --> 00:27:23,840

uh so we told it to go essentially

697

00:27:28,389 --> 00:27:25,840

towards the north

698

00:27:30,310 --> 00:27:28,399

and where it is but we always we don't

699

00:27:32,470 --> 00:27:30,320

have telemetry that part of that mission

700

00:27:33,430 --> 00:27:32,480

so we don't know so we the only way that

701
00:27:35,430 --> 00:27:33,440
we're gonna find out is through

702
00:27:38,549 --> 00:27:35,440
high-rise

703
00:27:40,149 --> 00:27:38,559
you know taking an image so

704
00:27:41,750 --> 00:27:40,159
but you know we think it's going to be

705
00:27:45,029 --> 00:27:41,760
hundreds of meters it's designed to do

706
00:27:49,669 --> 00:27:47,909
okay go ahead hi eric hand with nature

707
00:27:51,190 --> 00:27:49,679
questions for sarah

708
00:27:52,950 --> 00:27:51,200
so you estimate that this was six

709
00:27:54,549 --> 00:27:52,960
minutes after entry so about a minute

710
00:27:55,990 --> 00:27:54,559
before landing

711
00:27:59,190 --> 00:27:56,000
um

712
00:27:59,990 --> 00:27:59,200
that's after the heat shield uh popped

713
00:28:01,669 --> 00:28:00,000

off

714

00:28:05,190 --> 00:28:01,679

have you looked for that

715

00:28:05,990 --> 00:28:05,200

any sign of that in the image

716

00:28:08,870 --> 00:28:06,000

uh

717

00:28:10,789 --> 00:28:08,880

no we haven't looked for that in in this

718

00:28:12,710 --> 00:28:10,799

image um

719

00:28:16,870 --> 00:28:12,720

i don't think

720

00:28:18,230 --> 00:28:16,880

we'd be able to see it in this image i'm

721

00:28:21,669 --> 00:28:18,240

not sure

722

00:28:23,029 --> 00:28:21,679

we will be taking images

723

00:28:24,070 --> 00:28:23,039

of the landing

724

00:28:26,710 --> 00:28:24,080

site

725

00:28:29,190 --> 00:28:26,720

in the days to come the we might be

726
00:28:30,789 --> 00:28:29,200
taking an image within the next day but

727
00:28:32,070 --> 00:28:30,799
we're definitely taking that one would

728
00:28:34,470 --> 00:28:32,080
be

729
00:28:36,149 --> 00:28:34,480
a little hazy it's but the the we're

730
00:28:38,710 --> 00:28:36,159
taking a very good image

731
00:28:41,029 --> 00:28:38,720
six days from now uh and then another

732
00:28:42,470 --> 00:28:41,039
one 12 days from now and in those images

733
00:28:44,710 --> 00:28:42,480
we'll be able to look

734
00:28:46,310 --> 00:28:44,720
for where the other components landed as

735
00:28:48,789 --> 00:28:46,320
a quick follow-up what's your best

736
00:28:50,310 --> 00:28:48,799
estimate for the resolution of what

737
00:28:52,470 --> 00:28:50,320
we're seeing here with the parachute how

738
00:28:54,870 --> 00:28:52,480

many centimeters per pixel 33

739

00:28:56,310 --> 00:28:54,880

centimeters per pixel thanks

740

00:28:58,230 --> 00:28:56,320

i'm going to keep handing it down the

741

00:28:59,350 --> 00:28:58,240

row i think there were a couple more by

742

00:29:00,549 --> 00:28:59,360

the way we just had one thing on that we

743

00:29:02,149 --> 00:29:00,559

know the the image we're trying to take

744

00:29:03,269 --> 00:29:02,159

as soon as as possible is to help with

745

00:29:05,029 --> 00:29:03,279

the problem that miguel was talking

746

00:29:06,710 --> 00:29:05,039

about which is which is to localize the

747

00:29:08,149 --> 00:29:06,720

the lander with respect to topographic

748

00:29:10,630 --> 00:29:08,159

features that we can see to get it

749

00:29:12,149 --> 00:29:10,640

registered onto a map to aid the uh the

750

00:29:13,590 --> 00:29:12,159

dynamic solution that miguel talked

751
00:29:16,310 --> 00:29:13,600
about so we hope to have that in just a

752
00:29:20,710 --> 00:29:18,870
uh leo enright with irish television uh

753
00:29:22,630 --> 00:29:20,720
the blogosphere got very excited very

754
00:29:24,470 --> 00:29:22,640
quickly after the hazcam pictures came

755
00:29:26,549 --> 00:29:24,480
down about a blotch

756
00:29:28,230 --> 00:29:26,559
that appeared in both of the images

757
00:29:30,950 --> 00:29:28,240
looking uh

758
00:29:33,350 --> 00:29:30,960
looking out across the plains which they

759
00:29:36,470 --> 00:29:33,360
were interpreting as possibly the

760
00:29:37,269 --> 00:29:36,480
landing stage uh impact uh certainly it

761
00:29:39,510 --> 00:29:37,279
was

762
00:29:40,870 --> 00:29:39,520
this this picture came down very quickly

763
00:29:43,590 --> 00:29:40,880

much quicker i think than many of us

764

00:29:45,830 --> 00:29:43,600

expected and so it seemed that it could

765

00:29:47,430 --> 00:29:45,840

be but i wondered did you any of you

766

00:29:50,230 --> 00:29:47,440

think that you saw

767

00:29:52,389 --> 00:29:50,240

evidence for the landing stage impact

768

00:29:54,149 --> 00:29:52,399

uh that artif that that artifact

769

00:29:55,510 --> 00:29:54,159

whatever it is in the image it has been

770

00:29:56,950 --> 00:29:55,520

seen has been it's been talked about

771

00:29:59,110 --> 00:29:56,960

it's been suggested it could be

772

00:30:01,190 --> 00:29:59,120

something associated with landing uh it

773

00:30:02,549 --> 00:30:01,200

could be a dust devil uh i think we

774

00:30:03,909 --> 00:30:02,559

don't know but we have noticed that

775

00:30:05,510 --> 00:30:03,919

feature and it's too early to tell what

776

00:30:07,029 --> 00:30:05,520

it is but but we would like to take a

777

00:30:08,630 --> 00:30:07,039

look at it again

778

00:30:09,909 --> 00:30:08,640

if it's a transient feature then you

779

00:30:11,350 --> 00:30:09,919

know we don't have another image of it

780

00:30:13,350 --> 00:30:11,360

we just have that one image right so we

781

00:30:14,630 --> 00:30:13,360

can't go back and look at it um of

782

00:30:15,909 --> 00:30:14,640

course if the descent stage is there

783

00:30:17,350 --> 00:30:15,919

that might tell us where you know where

784

00:30:18,549 --> 00:30:17,360

to look you know when we get all of our

785

00:30:19,590 --> 00:30:18,559

cameras up

786

00:30:21,029 --> 00:30:19,600

um

787

00:30:22,549 --> 00:30:21,039

maybe there's some hope that well a

788

00:30:23,830 --> 00:30:22,559

mardi image might have captured

789

00:30:25,269 --> 00:30:23,840

something as well the descent imager

790

00:30:26,789 --> 00:30:25,279

when we get that and we're just starting

791

00:30:28,070 --> 00:30:26,799

to trickle down thumbnails over the next

792

00:30:30,310 --> 00:30:28,080

few days of that it'll take a little

793

00:30:32,950 --> 00:30:30,320

while to to get that and miguel anything

794

00:30:33,909 --> 00:30:32,960

to add nope

795

00:30:35,110 --> 00:30:33,919

okay we're going to take one more

796

00:30:36,710 --> 00:30:35,120

question from that row and then todd

797

00:30:41,269 --> 00:30:36,720

we're coming over to your row next okay

798

00:30:44,870 --> 00:30:43,350

jonathan amos uh bbc news what's the the

799

00:30:46,630 --> 00:30:44,880

distance to the rim that we're seeing in

800

00:30:48,149 --> 00:30:46,640

the uh the image here you gave us a

801
00:30:50,389 --> 00:30:48,159
distance to the uh

802
00:30:52,389 --> 00:30:50,399
mount sharp what's what give us some

803
00:30:53,909 --> 00:30:52,399
sense of uh how far we are from the

804
00:30:55,669 --> 00:30:53,919
other large features the topographic

805
00:30:57,669 --> 00:30:55,679
features that you're talking about yeah

806
00:30:58,389 --> 00:30:57,679
let's just uh pull up the image again of

807
00:31:02,710 --> 00:30:58,399
the

808
00:31:04,149 --> 00:31:02,720
uh just uh

809
00:31:06,470 --> 00:31:04,159
in front of this one i believe that's

810
00:31:09,509 --> 00:31:06,480
showing there we go so the the ellipse

811
00:31:12,310 --> 00:31:09,519
there is 20 kilometers so if we land uh

812
00:31:14,789 --> 00:31:12,320
just to the right of the uh

813
00:31:15,669 --> 00:31:14,799

of the x in in the middle there

814

00:31:17,190 --> 00:31:15,679

you know

815

00:31:18,789 --> 00:31:17,200

i'd i'd guess on the order of 20

816

00:31:25,029 --> 00:31:18,799

kilometers to the rim something like

817

00:31:27,750 --> 00:31:26,549

okay we'll go we'll take one here in the

818

00:31:29,430 --> 00:31:27,760

front row and then we're going to move

819

00:31:31,990 --> 00:31:29,440

back here

820

00:31:34,070 --> 00:31:32,000

hi leonard david with aia aerospace

821

00:31:35,830 --> 00:31:34,080

america and space.com

822

00:31:38,470 --> 00:31:35,840

just curious on the

823

00:31:40,070 --> 00:31:38,480

sky crane as far as residual fuel i

824

00:31:41,909 --> 00:31:40,080

heard a number i just wonder if you got

825

00:31:44,389 --> 00:31:41,919

refinements on it and

826

00:31:47,350 --> 00:31:44,399

and what was the touchdown speed

827

00:31:51,029 --> 00:31:47,360

any way you can appreciate what exactly

828

00:31:54,230 --> 00:31:51,039

uh speed you hit uh surface well yes uh

829

00:31:56,230 --> 00:31:54,240

as far as the first i'm going to ask my

830

00:31:59,269 --> 00:31:56,240

friend and colleague adam he's not here

831

00:32:01,990 --> 00:31:59,279

because i don't but yeah it's 140 840

832

00:32:03,830 --> 00:32:02,000

kilograms i think it's 140 kilograms yes

833

00:32:05,909 --> 00:32:03,840

that's my memory yeah yes okay that

834

00:32:08,310 --> 00:32:05,919

sounds about right so we we ended up

835

00:32:11,110 --> 00:32:08,320

with a lot of kilograms of fuel

836

00:32:14,310 --> 00:32:11,120

which is a you know good thing i guess

837

00:32:19,269 --> 00:32:16,149

uh that you're saying as opposed to the

838

00:32:21,269 --> 00:32:19,279

opposite yes yes i take that first right

839

00:32:24,070 --> 00:32:21,279

at a touchdown speed oh the touch does

840

00:32:26,149 --> 00:32:24,080

be reported by this by this the

841

00:32:27,990 --> 00:32:26,159

spacecraft itself which navigation

842

00:32:30,149 --> 00:32:28,000

sensor is point seven it actually was

843

00:32:33,029 --> 00:32:30,159

dead on the money right you know prior

844

00:32:36,389 --> 00:32:33,039

to it the declaring touchdown okay so we

845

00:32:37,269 --> 00:32:36,399

were coming at 0.75 degrees now that's

846

00:32:38,149 --> 00:32:37,279

that's

847

00:32:42,389 --> 00:32:38,159

but

848

00:32:45,029 --> 00:32:42,399

excuse me 0.75 uh meters per second uh

849

00:32:45,750 --> 00:32:45,039

which is the intended velocity now

850

00:32:48,070 --> 00:32:45,760

uh

851
00:32:50,070 --> 00:32:48,080
if there is a bias or an error in the

852
00:32:51,590 --> 00:32:50,080
navigation sensor itself

853
00:32:53,350 --> 00:32:51,600
you could not tell

854
00:32:54,710 --> 00:32:53,360
that so it's going to require more

855
00:32:57,830 --> 00:32:54,720
analysis

856
00:32:59,350 --> 00:32:57,840
to really especially for marty it's

857
00:33:01,830 --> 00:32:59,360
going to be very useful

858
00:33:02,549 --> 00:33:01,840
uh to be able to really tease out what

859
00:33:07,430 --> 00:33:02,559
the

860
00:33:09,430 --> 00:33:07,440
right now we can only uh

861
00:33:11,669 --> 00:33:09,440
give you what the spacecraft thinks its

862
00:33:14,470 --> 00:33:11,679
velocity was and that was

863
00:33:17,190 --> 00:33:14,480

0.75 meters per second vertically and

864

00:33:19,110 --> 00:33:17,200

four centimeters per second horizontally

865

00:33:22,630 --> 00:33:19,120

okay so

866

00:33:25,110 --> 00:33:22,640

it's a very small number compared to

867

00:33:26,789 --> 00:33:25,120

two previous uh attempts so we'll see

868

00:33:28,549 --> 00:33:26,799

whether the uh

869

00:33:30,470 --> 00:33:28,559

the the the

870

00:33:32,149 --> 00:33:30,480

imaging coming down whether we can

871

00:33:34,389 --> 00:33:32,159

corroborate that number it would be nice

872

00:33:35,509 --> 00:33:34,399

for a guidance and control point of view

873

00:33:38,389 --> 00:33:35,519

if that's the case that's called

874

00:33:40,950 --> 00:33:38,399

straight down yes

875

00:33:43,430 --> 00:33:40,960

and maybe for sarah just maybe gauging

876

00:33:46,149 --> 00:33:43,440

the difficulty the degree of difficulty

877

00:33:49,269 --> 00:33:46,159

everybody's into the olympics

878

00:33:52,310 --> 00:33:49,279

you know between phoenix and imaging

879

00:33:53,669 --> 00:33:52,320

uh curiosity coming in what was the was

880

00:33:56,470 --> 00:33:53,679

it tougher was it

881

00:33:59,830 --> 00:33:56,480

it was tougher because of the the

882

00:34:02,389 --> 00:33:59,840

relative positions of the of the two

883

00:34:05,110 --> 00:34:02,399

spacecraft um

884

00:34:06,470 --> 00:34:05,120

i s the the team

885

00:34:08,869 --> 00:34:06,480

sort of internally

886

00:34:10,149 --> 00:34:08,879

guesstimated that phoenix wasn't they

887

00:34:12,550 --> 00:34:10,159

had an 80

888

00:34:15,349 --> 00:34:12,560

probability of getting that image and

889

00:34:17,909 --> 00:34:15,359

msl it was a 60 probability

890

00:34:18,829 --> 00:34:17,919

so this was you know this was a great

891

00:34:20,629 --> 00:34:18,839

great

892

00:34:23,270 --> 00:34:20,639

shot

893

00:34:25,510 --> 00:34:23,280

okay todd um todd halperson

894

00:34:28,230 --> 00:34:25,520

florida today and usa today for whoever

895

00:34:31,349 --> 00:34:28,240

can handle it um based on what you know

896

00:34:34,389 --> 00:34:31,359

right now could you update us on when

897

00:34:37,669 --> 00:34:34,399

you expect the delivery of

898

00:34:39,669 --> 00:34:37,679

higher resolution black and white photos

899

00:34:42,069 --> 00:34:39,679

color imagery

900

00:34:44,470 --> 00:34:42,079

the first panorama you mentioned

901
00:34:46,629 --> 00:34:44,480
thumbnails were coming down from marty

902
00:34:49,190 --> 00:34:46,639
and maybe the first

903
00:34:50,629 --> 00:34:49,200
full video from the descent camera

904
00:34:53,109 --> 00:34:50,639
thanks

905
00:34:54,710 --> 00:34:53,119
um yeah so basically the the the the

906
00:34:57,270 --> 00:34:54,720
date we're still in the nominal plan

907
00:34:59,030 --> 00:34:57,280
exactly um and i think uh in one of the

908
00:35:01,430 --> 00:34:59,040
earlier press conferences uh richard

909
00:35:02,470 --> 00:35:01,440
cook uh gave a a approximate list of

910
00:35:04,550 --> 00:35:02,480
dates

911
00:35:06,150 --> 00:35:04,560
um so basically we we start to get we

912
00:35:07,990 --> 00:35:06,160
believe we'll get

913
00:35:09,670 --> 00:35:08,000

a front haz cam

914

00:35:11,670 --> 00:35:09,680

that has the same resolution as the rear

915

00:35:14,870 --> 00:35:11,680

that we were showing today uh in just a

916

00:35:16,390 --> 00:35:14,880

couple of hours from now about 11 30

917

00:35:19,030 --> 00:35:16,400

and we will start to trickle down some

918

00:35:20,870 --> 00:35:19,040

thumbnails from the descent imager and

919

00:35:23,430 --> 00:35:20,880

then in the next day or two after that

920

00:35:25,829 --> 00:35:23,440

we start getting um uh better resolution

921

00:35:27,270 --> 00:35:25,839

marty's as well as our first panoramas

922

00:35:30,310 --> 00:35:27,280

of the from these are black and white

923

00:35:32,150 --> 00:35:30,320

panoramas we also get a single color

924

00:35:33,670 --> 00:35:32,160

frame from the mali instrument which is

925

00:35:35,750 --> 00:35:33,680

in the stowed position but it looks out

926
00:35:37,510 --> 00:35:35,760
to the side and it can focus at infinity

927
00:35:40,069 --> 00:35:37,520
and that will look a lot like a single

928
00:35:41,270 --> 00:35:40,079
frame you know kind of panoramic um

929
00:35:42,870 --> 00:35:41,280
image that you're used to seeing you

930
00:35:44,390 --> 00:35:42,880
know it looks like it doesn't look like

931
00:35:46,790 --> 00:35:44,400
it it's taken from a microscope it looks

932
00:35:48,630 --> 00:35:46,800
like you know a a regular camera since

933
00:35:49,990 --> 00:35:48,640
it focuses at infinity so that will be

934
00:35:51,990 --> 00:35:50,000
the first color image that we get down

935
00:35:55,030 --> 00:35:52,000
that molle image and it's uh about two

936
00:35:59,270 --> 00:35:56,550
okay uh you were next and then we're

937
00:36:01,270 --> 00:35:59,280
going to come forward to you and then

938
00:36:03,030 --> 00:36:01,280

oh hi this

939

00:36:04,150 --> 00:36:03,040

is mike wall from space.com i guess this

940

00:36:06,069 --> 00:36:04,160

is from

941

00:36:07,670 --> 00:36:06,079

or this is for john if you guys can't

942

00:36:09,750 --> 00:36:07,680

actually find where the sky crane came

943

00:36:11,270 --> 00:36:09,760

down or or actually identify some of the

944

00:36:12,870 --> 00:36:11,280

craters that were created by the ballast

945

00:36:13,990 --> 00:36:12,880

being injected i mean

946

00:36:15,510 --> 00:36:14,000

like

947

00:36:17,829 --> 00:36:15,520

yeah how high of priority would it be to

948

00:36:19,910 --> 00:36:17,839

go check out those new fresh impact

949

00:36:21,349 --> 00:36:19,920

craters as as sort of compared to all

950

00:36:24,069 --> 00:36:21,359

the other work that that you would like

951
00:36:28,950 --> 00:36:27,349
an inevitable question uh i you know i

952
00:36:30,710 --> 00:36:28,960
in terms of where the sky crane came

953
00:36:33,510 --> 00:36:30,720
down the descent stage with all the

954
00:36:35,430 --> 00:36:33,520
hydrazine that that uh might be present

955
00:36:37,109 --> 00:36:35,440
there we would we would actually really

956
00:36:40,470 --> 00:36:37,119
prefer to avoid that

957
00:36:42,870 --> 00:36:40,480
and i i don't doubt that if if our

958
00:36:44,790 --> 00:36:42,880
path of science takes us near it we're

959
00:36:46,950 --> 00:36:44,800
we're really going to try to image it

960
00:36:49,030 --> 00:36:46,960
and do everything we can to study it but

961
00:36:50,950 --> 00:36:49,040
otherwise we try to avoid it as far as

962
00:36:53,349 --> 00:36:50,960
the balance goes that was something that

963
00:36:55,510 --> 00:36:53,359

that i was really hoping for

964

00:36:57,510 --> 00:36:55,520

and then i talked to miguel and adam i

965

00:37:00,390 --> 00:36:57,520

those blocks are ejected so far down

966

00:37:01,829 --> 00:37:00,400

track we have no hope but you know

967

00:37:03,430 --> 00:37:01,839

striking the surface they might give us

968

00:37:05,589 --> 00:37:03,440

a nice fresh exposure without any

969

00:37:07,190 --> 00:37:05,599

contamination so but that doesn't seem

970

00:37:08,950 --> 00:37:07,200

like it's in the cards

971

00:37:09,750 --> 00:37:08,960

i'd like to add a little thing to that

972

00:37:10,950 --> 00:37:09,760

um

973

00:37:14,790 --> 00:37:10,960

we actually

974

00:37:17,910 --> 00:37:14,800

on purpose we instructed the cent stage

975

00:37:20,230 --> 00:37:17,920

to uh fly away from where the science is

976
00:37:22,150 --> 00:37:20,240
not to contaminate it so we actually if

977
00:37:22,950 --> 00:37:22,160
you you know we gave a command to this

978
00:37:26,550 --> 00:37:22,960
to

979
00:37:27,750 --> 00:37:26,560
draw a line from

980
00:37:29,829 --> 00:37:27,760
east west

981
00:37:32,470 --> 00:37:29,839
to go north of that line

982
00:37:34,310 --> 00:37:32,480
exactly in what direction depends on the

983
00:37:36,870 --> 00:37:34,320
orientation of the of the descent stage

984
00:37:39,270 --> 00:37:36,880
at that point because we want to do a

985
00:37:40,470 --> 00:37:39,280
turn with the thrusters away from the

986
00:37:41,270 --> 00:37:40,480
spacecraft

987
00:37:43,589 --> 00:37:41,280
so

988
00:37:45,910 --> 00:37:43,599

we have done everything possible to fly

989

00:37:47,670 --> 00:37:45,920

it away from where the science is so we

990

00:37:48,829 --> 00:37:47,680

would make

991

00:37:51,910 --> 00:37:48,839

that

992

00:37:55,829 --> 00:37:51,920

even more difficult

993

00:37:59,109 --> 00:37:58,069

irene klotz with reuters and discovery

994

00:38:01,349 --> 00:37:59,119

news

995

00:38:03,910 --> 00:38:01,359

two quick housekeeping questions is the

996

00:38:06,470 --> 00:38:03,920

first is how many pictures not including

997

00:38:09,829 --> 00:38:06,480

the stunning mro shot has

998

00:38:11,750 --> 00:38:09,839

msl returned so far and what time is the

999

00:38:13,510 --> 00:38:11,760

high gain supposed to be

1000

00:38:15,670 --> 00:38:13,520

deployed and then i have a question for

1001
00:38:16,829 --> 00:38:15,680

john

1002
00:38:18,470 --> 00:38:16,839

it has

1003
00:38:21,829 --> 00:38:18,480

returned

1004
00:38:24,470 --> 00:38:21,839

uh four thumbnails

1005
00:38:28,630 --> 00:38:24,480

two down sampled images with the covers

1006
00:38:31,430 --> 00:38:28,640

on and one those are 256x256 and one 512

1007
00:38:33,190 --> 00:38:31,440

by 512 down sampled rear haz cam with

1008
00:38:35,589 --> 00:38:33,200

the cover off

1009
00:38:37,270 --> 00:38:35,599

i think that's everything

1010
00:38:41,270 --> 00:38:37,280

and the high gain deploy high gain

1011
00:38:42,710 --> 00:38:41,280

deploy is in the afternoon mars time

1012
00:38:44,870 --> 00:38:42,720

uh today

1013
00:38:47,430 --> 00:38:44,880

so about

1014

00:38:49,990 --> 00:38:47,440

12 hours from now or so

1015

00:38:51,829 --> 00:38:50,000

thanks and um for john you mentioned

1016

00:38:53,910 --> 00:38:51,839

that uh one of the first things you

1017

00:38:56,550 --> 00:38:53,920

might like to do is uh do a

1018

00:38:57,510 --> 00:38:56,560

representative soil analysis i was just

1019

00:38:59,910 --> 00:38:57,520

curious

1020

00:39:01,190 --> 00:38:59,920

what sort of variations in the soil is

1021

00:39:04,390 --> 00:39:01,200

there from

1022

00:39:06,790 --> 00:39:04,400

viking one to spirit opportunity and

1023

00:39:08,870 --> 00:39:06,800

phoenix if that's a valid sample just

1024

00:39:10,069 --> 00:39:08,880

what sort of variation have you seen in

1025

00:39:11,829 --> 00:39:10,079

the past and

1026

00:39:14,870 --> 00:39:11,839

what might you be looking for that's

1027

00:39:16,630 --> 00:39:14,880

different on this site thanks

1028

00:39:18,630 --> 00:39:16,640

yeah it's uh there's there's two

1029

00:39:21,270 --> 00:39:18,640

separate objectives you know the one

1030

00:39:24,230 --> 00:39:21,280

that we're also after is the composition

1031

00:39:26,310 --> 00:39:24,240

of the bedrock but we we infer that the

1032

00:39:28,550 --> 00:39:26,320

composition of the bedrock is going to

1033

00:39:30,790 --> 00:39:28,560

represent local processes that happen

1034

00:39:33,910 --> 00:39:30,800

that form that bedrock

1035

00:39:36,230 --> 00:39:33,920

whereas the the soil of mars in a place

1036

00:39:39,190 --> 00:39:36,240

like we've landed in will represent a

1037

00:39:41,510 --> 00:39:39,200

more global integrated average of of

1038

00:39:43,190 --> 00:39:41,520

dust that has blown around the planet

1039

00:39:45,510 --> 00:39:43,200

and other materials that have worked

1040

00:39:48,470 --> 00:39:45,520

their way over long distances

1041

00:39:49,910 --> 00:39:48,480

and and while we have no independent way

1042

00:39:52,550 --> 00:39:49,920

to demonstrate that what we might

1043

00:39:55,030 --> 00:39:52,560

measure with curiosity

1044

00:39:57,990 --> 00:39:55,040

must be analogous to what was measured

1045

00:39:59,990 --> 00:39:58,000

with viking many decades ago

1046

00:40:01,910 --> 00:40:00,000

the character of the soil every time

1047

00:40:04,630 --> 00:40:01,920

we've sampled it beginning with viking

1048

00:40:06,470 --> 00:40:04,640

and most recently with the mers

1049

00:40:07,510 --> 00:40:06,480

for example has a very high sulfur

1050

00:40:09,349 --> 00:40:07,520

content

1051

00:40:11,990 --> 00:40:09,359

we'd like to know definitively what

1052

00:40:14,470 --> 00:40:12,000

minerals are in that soil and so by

1053

00:40:15,990 --> 00:40:14,480

analyzing it with sam and chemin for

1054

00:40:18,550 --> 00:40:16,000

example

1055

00:40:20,710 --> 00:40:18,560

we can get a better understanding of of

1056

00:40:22,470 --> 00:40:20,720

what the composition of the soil is

1057

00:40:24,790 --> 00:40:22,480

certainly where we've landed and by

1058

00:40:27,829 --> 00:40:24,800

inference maybe also globally

1059

00:40:29,430 --> 00:40:27,839

and uh and and through that get it one

1060

00:40:31,109 --> 00:40:29,440

of the most global questions we could

1061

00:40:32,790 --> 00:40:31,119

address

1062

00:40:34,550 --> 00:40:32,800

okay we're going first to bill harwood

1063

00:40:36,470 --> 00:40:34,560

and then alan thank you thanks bill

1064

00:40:37,750 --> 00:40:36,480

hartwick cbs news i'm just continuing on

1065

00:40:39,670 --> 00:40:37,760

soil for a bit john just from a

1066

00:40:41,270 --> 00:40:39,680

mechanical standpoint were you guys

1067

00:40:43,670 --> 00:40:41,280

surprised at the amount of dust on the

1068

00:40:45,750 --> 00:40:43,680

dust cover given how high the engines

1069

00:40:47,430 --> 00:40:45,760

were seven and a half meters or whatever

1070

00:40:48,790 --> 00:40:47,440

at the top of that bridle does that tell

1071

00:40:50,230 --> 00:40:48,800

you anything about

1072

00:40:51,829 --> 00:40:50,240

the consistency or the mechanical

1073

00:40:54,390 --> 00:40:51,839

properties of the soil it's a good

1074

00:40:57,670 --> 00:40:54,400

question uh i i think we were surprised

1075

00:41:00,550 --> 00:40:57,680

because the images that uh have the dust

1076

00:41:03,270 --> 00:41:00,560

covers off still show some dust on them

1077

00:41:05,910 --> 00:41:03,280

so so some little bit got in there on

1078

00:41:07,990 --> 00:41:05,920

the other hand based on myrrh experience

1079

00:41:09,990 --> 00:41:08,000

the dust comes and goes and when the

1080

00:41:11,910 --> 00:41:10,000

wind blows and it's a clear air flow it

1081

00:41:13,349 --> 00:41:11,920

will probably just blow it right off and

1082

00:41:15,990 --> 00:41:13,359

then it will come back on again when we

1083

00:41:18,710 --> 00:41:16,000

have a dust storm or a dust devil go by

1084

00:41:20,950 --> 00:41:18,720

and it'll sort of wax and wane

1085

00:41:23,349 --> 00:41:20,960

um

1086

00:41:25,349 --> 00:41:23,359

the the other interesting observation is

1087

00:41:28,309 --> 00:41:25,359

if you look at that rear haz cam image

1088

00:41:31,430 --> 00:41:28,319

again you'll notice that the the wheel

1089

00:41:34,470 --> 00:41:31,440

is on relatively firm ground and so with

1090

00:41:37,750 --> 00:41:34,480

miguel's estimate of 0.75 meters per

1091

00:41:40,230 --> 00:41:37,760

second descent velocity straight down we

1092

00:41:42,470 --> 00:41:40,240

didn't get any sinkage there so you know

1093

00:41:44,630 --> 00:41:42,480

that's a that's sort of a inference

1094

00:41:46,309 --> 00:41:44,640

inferential science observation that the

1095

00:41:49,030 --> 00:41:46,319

material we landed on has pretty

1096

00:41:50,550 --> 00:41:49,040

substantial bearing strength and is is

1097

00:41:53,349 --> 00:41:50,560

probably firm

1098

00:41:54,710 --> 00:41:53,359

and uh so for that reason we might

1099

00:41:56,710 --> 00:41:54,720

choose to drive somewhere else to

1100

00:41:58,230 --> 00:41:56,720

actually get our scoop out and and dig

1101
00:41:59,750 --> 00:41:58,240
in there because the first thing that we

1102
00:42:00,829 --> 00:41:59,760
want to scoop we really do want to be a

1103
00:42:03,430 --> 00:42:00,839
pretty soft

1104
00:42:05,190 --> 00:42:03,440
material thanks and and for mike you

1105
00:42:06,790 --> 00:42:05,200
mentioned the the health of the vehicle

1106
00:42:08,230 --> 00:42:06,800
as you know it today and realizing it's

1107
00:42:09,670 --> 00:42:08,240
not all in yet but

1108
00:42:11,190 --> 00:42:09,680
uh are there any glitches or any

1109
00:42:13,270 --> 00:42:11,200
anomalies at all on the day even if

1110
00:42:14,870 --> 00:42:13,280
they're minor and for all of you really

1111
00:42:16,630 --> 00:42:14,880
or for any of you i mean you guys have

1112
00:42:17,990 --> 00:42:16,640
convinced us you know really

1113
00:42:19,750 --> 00:42:18,000

how how

1114

00:42:21,190 --> 00:42:19,760

technically difficult this was i think a

1115

00:42:23,349 --> 00:42:21,200

lot of folks had a lot of trepidation

1116

00:42:25,430 --> 00:42:23,359

going into this folks on the outside did

1117

00:42:27,510 --> 00:42:25,440

you guys ever imagine you'd be here this

1118

00:42:32,150 --> 00:42:27,520

morning with the vehicle and the shape

1119

00:42:34,390 --> 00:42:32,160

it's in uh telling us this story thanks

1120

00:42:36,069 --> 00:42:34,400

um there is there are no known there are

1121

00:42:38,230 --> 00:42:36,079

no anomalies that are outside the

1122

00:42:39,670 --> 00:42:38,240

expected range that that we would think

1123

00:42:40,790 --> 00:42:39,680

is okay to proceed with activities you

1124

00:42:42,829 --> 00:42:40,800

know some things are doing a little

1125

00:42:44,870 --> 00:42:42,839

better some systems are you

1126

00:42:46,150 --> 00:42:44,880

know reading a little higher than we

1127

00:42:47,430 --> 00:42:46,160

expected some a little lower but

1128

00:42:49,030 --> 00:42:47,440

everything sort of within the accepted

1129

00:42:50,950 --> 00:42:49,040

bounds that we view as being acceptable

1130

00:42:52,470 --> 00:42:50,960

to you know to move forward there's no

1131

00:42:54,390 --> 00:42:52,480

no real anomaly in work that's causing

1132

00:42:56,470 --> 00:42:54,400

us to slow down and defer activities

1133

00:42:57,589 --> 00:42:56,480

because of that um but you know because

1134

00:42:59,589 --> 00:42:57,599

we're engineers and because we're

1135

00:43:01,270 --> 00:42:59,599

perfectionists every little thing that's

1136

00:43:02,870 --> 00:43:01,280

different has you know folks want to go

1137

00:43:04,630 --> 00:43:02,880

take a look at you know why is this five

1138

00:43:06,150 --> 00:43:04,640

percent different from the way it was in

1139

00:43:08,069 --> 00:43:06,160

the test you know

1140

00:43:09,910 --> 00:43:08,079

um and that will continue but but you

1141

00:43:12,230 --> 00:43:09,920

know we're still moving forward

1142

00:43:13,349 --> 00:43:12,240

um you know i in terms of success i

1143

00:43:15,589 --> 00:43:13,359

think each of us would answer that

1144

00:43:17,430 --> 00:43:15,599

differently uh i think we all believed

1145

00:43:18,950 --> 00:43:17,440

it would land successfully although we

1146

00:43:20,069 --> 00:43:18,960

were worried because we wouldn't be

1147

00:43:22,150 --> 00:43:20,079

working on it and we wouldn't have

1148

00:43:24,230 --> 00:43:22,160

designed a two-year surface mission with

1149

00:43:25,750 --> 00:43:24,240

all of the science payload and a 20

1150

00:43:28,390 --> 00:43:25,760

kilometer traverse if we thought it was

1151

00:43:30,230 --> 00:43:28,400

not going to land successfully um i

1152

00:43:32,069 --> 00:43:30,240

think um as pete is mentioned several

1153

00:43:33,910 --> 00:43:32,079

times um

1154

00:43:35,510 --> 00:43:33,920

we're always it's a very complex vehicle

1155

00:43:36,630 --> 00:43:35,520

and we're we're a little bit concerned

1156

00:43:41,349 --> 00:43:36,640

that

1157

00:43:44,470 --> 00:43:41,359

would take us a little while to get out

1158

00:43:46,390 --> 00:43:44,480

of it uh we might not get a a calm pass

1159

00:43:47,510 --> 00:43:46,400

and you know um just for telecom reasons

1160

00:43:48,550 --> 00:43:47,520

the rover might have been perfectly

1161

00:43:50,390 --> 00:43:48,560

healthy but you didn't get the

1162

00:43:52,790 --> 00:43:50,400

communications pass with the orbiter and

1163

00:43:54,470 --> 00:43:52,800

so you have to sit in and and worry and

1164

00:43:55,829 --> 00:43:54,480

and and just wait

1165

00:43:57,589 --> 00:43:55,839

um the fact that it that it went

1166

00:44:00,150 --> 00:43:57,599

straight into surface nominal didn't

1167

00:44:02,069 --> 00:44:00,160

safe uh we got great telecom performance

1168

00:44:03,270 --> 00:44:02,079

the orbiters performed beautifully um

1169

00:44:05,190 --> 00:44:03,280

that you know this very complicated

1170

00:44:06,390 --> 00:44:05,200

avionics with reno redundant computers

1171

00:44:08,710 --> 00:44:06,400

and redundant

1172

00:44:10,069 --> 00:44:08,720

um avionics modules has all been fine

1173

00:44:11,829 --> 00:44:10,079

and and i think we're pleasantly

1174

00:44:12,870 --> 00:44:11,839

surprised at how smooth that part is is

1175

00:44:14,150 --> 00:44:12,880

going

1176
00:44:15,510 --> 00:44:14,160
and miguel do you want to comment on

1177
00:44:17,510 --> 00:44:15,520
there yeah

1178
00:44:19,190 --> 00:44:17,520
yeah that's that's you explain it very

1179
00:44:22,230 --> 00:44:19,200
well i mean if we if we didn't feel that

1180
00:44:23,750 --> 00:44:22,240
it it was doable or we felt there was no

1181
00:44:25,030 --> 00:44:23,760
no chance of success we would not be

1182
00:44:27,190 --> 00:44:25,040
doing it

1183
00:44:29,270 --> 00:44:27,200
that said i mean we train ourselves for

1184
00:44:31,589 --> 00:44:29,280
eight years to think the worst all the

1185
00:44:33,750 --> 00:44:31,599
time what how come we you know if you're

1186
00:44:36,710 --> 00:44:33,760
in the shower thinking what what what

1187
00:44:38,390 --> 00:44:36,720
thing come you can give you a bad day i

1188
00:44:39,750 --> 00:44:38,400

mean that's what you do i mean it's

1189

00:44:41,510 --> 00:44:39,760

constantly

1190

00:44:43,910 --> 00:44:41,520

thinking ways that things can go wrong

1191

00:44:45,750 --> 00:44:43,920

so you can go and do something about it

1192

00:44:48,309 --> 00:44:45,760

and then you can never turn that off

1193

00:44:49,109 --> 00:44:48,319

okay and then it's all the way in you

1194

00:44:52,390 --> 00:44:49,119

are

1195

00:44:54,790 --> 00:44:52,400

you know and especially the few days

1196

00:44:56,870 --> 00:44:54,800

into the uh

1197

00:44:58,630 --> 00:44:56,880

the few days coming to the landing when

1198

00:45:00,870 --> 00:44:58,640

you also know that you don't have time

1199

00:45:02,790 --> 00:45:00,880

to recover it's even more

1200

00:45:04,309 --> 00:45:02,800

uh the the

1201

00:45:07,030 --> 00:45:04,319

the

1202

00:45:09,109 --> 00:45:07,040

pressure is even higher uh so

1203

00:45:11,510 --> 00:45:09,119

um it is a you know a landing is a

1204

00:45:13,829 --> 00:45:11,520

little bit like a rocket launch okay

1205

00:45:15,109 --> 00:45:13,839

it's that type of violence that's so

1206

00:45:17,430 --> 00:45:15,119

unforgiving

1207

00:45:20,069 --> 00:45:17,440

okay and even till these days once in a

1208

00:45:22,309 --> 00:45:20,079

while we lose a launch and uh and we

1209

00:45:24,309 --> 00:45:22,319

were very nervous on this launch and

1210

00:45:25,750 --> 00:45:24,319

those are things that we practice

1211

00:45:27,109 --> 00:45:25,760

much more

1212

00:45:28,150 --> 00:45:27,119

you know you can actually count the

1213

00:45:30,550 --> 00:45:28,160

numbers of

1214

00:45:33,109 --> 00:45:30,560

mars landing with one hand and

1215

00:45:35,990 --> 00:45:33,119

it's so it's it's so it's going to take

1216

00:45:37,829 --> 00:45:36,000

a long long time for us to really

1217

00:45:39,510 --> 00:45:37,839

be totally sure that these things are

1218

00:45:42,309 --> 00:45:39,520

going to work like you feel sure about

1219

00:45:43,270 --> 00:45:42,319

an airplane taking off and landing so

1220

00:45:45,270 --> 00:45:43,280

um

1221

00:45:46,630 --> 00:45:45,280

but that's what we're going to need but

1222

00:45:47,829 --> 00:45:46,640

you know we're going to continue trying

1223

00:45:49,829 --> 00:45:47,839

and we're going to be nervous the next

1224

00:45:51,990 --> 00:45:49,839

time the same no matter how well this

1225

00:45:53,829 --> 00:45:52,000

one worked

1226
00:45:57,750 --> 00:45:53,839
i think we need two hands now though

1227
00:45:57,760 --> 00:46:03,670
just barely just barely

1228
00:46:07,510 --> 00:46:05,750
nbc news and

1229
00:46:10,230 --> 00:46:07,520
just a couple of questions that i

1230
00:46:12,309 --> 00:46:10,240
may have missed um

1231
00:46:16,230 --> 00:46:12,319
is there any marty imagery from the

1232
00:46:18,950 --> 00:46:16,240
descendant imager uh and on the mro

1233
00:46:21,109 --> 00:46:18,960
picture uh what's the distance from

1234
00:46:23,109 --> 00:46:21,119
which that picture was taken where where

1235
00:46:26,230 --> 00:46:23,119
is the

1236
00:46:29,190 --> 00:46:26,240
the rover in relation to mro

1237
00:46:31,030 --> 00:46:29,200
there is no marty data down right now um

1238
00:46:33,349 --> 00:46:31,040

in uh about an hour and a half from now

1239

00:46:36,150 --> 00:46:33,359

or so two hours uh we're going to get

1240

00:46:37,990 --> 00:46:36,160

another pass from the orbiters and uh we

1241

00:46:39,109 --> 00:46:38,000

we might get some marty thumbnails in

1242

00:46:40,309 --> 00:46:39,119

that you know these are very small to

1243

00:46:42,470 --> 00:46:40,319

help us understand what are the right

1244

00:46:45,349 --> 00:46:42,480

images to you know to grab from marty

1245

00:46:49,349 --> 00:46:45,359

but as of today they're not down

1246

00:46:51,829 --> 00:46:49,359

and mro was 340 kilometers

1247

00:46:53,750 --> 00:46:51,839

from msl

1248

00:46:55,589 --> 00:46:53,760

and i'll just point out that we do hope

1249

00:46:57,349 --> 00:46:55,599

to hold another news conference at four

1250

00:46:59,030 --> 00:46:57,359

o'clock today pacific time to show the

1251
00:47:00,630 --> 00:46:59,040
marty thumbnails if we do indeed get

1252
00:47:02,550 --> 00:47:00,640
those today so we'll have an update for

1253
00:47:03,829 --> 00:47:02,560
you that soon soon all right let's go

1254
00:47:05,829 --> 00:47:03,839
back to by the way i want to correct one

1255
00:47:07,349 --> 00:47:05,839
thing i said about the time of the hda

1256
00:47:08,710 --> 00:47:07,359
deploy i think i said it ends in the

1257
00:47:12,470 --> 00:47:08,720
afternoon about one o'clock it starts

1258
00:47:13,910 --> 00:47:12,480
about 11 o'clock mars time

1259
00:47:14,950 --> 00:47:13,920
and it ends in the afternoon starts just

1260
00:47:16,630 --> 00:47:14,960
before noon

1261
00:47:17,829 --> 00:47:16,640
okay let's go uh first to emily lock

1262
00:47:19,750 --> 00:47:17,839
dewalla and then we'll go back to john

1263
00:47:20,549 --> 00:47:19,760

johnson she's got her hand up there we

1264

00:47:22,390 --> 00:47:20,559

go

1265

00:47:23,670 --> 00:47:22,400

i have two questions the first one is do

1266

00:47:27,430 --> 00:47:23,680

we have any information yet on the

1267

00:47:29,990 --> 00:47:27,440

health of any of the science instruments

1268

00:47:31,190 --> 00:47:30,000

um yes we have we have we have a health

1269

00:47:32,710 --> 00:47:31,200

of many of them all of them that we've

1270

00:47:34,150 --> 00:47:32,720

done to check out and they're all fine

1271

00:47:36,150 --> 00:47:34,160

they're all in in perfect health and

1272

00:47:37,910 --> 00:47:36,160

operating as expected

1273

00:47:39,990 --> 00:47:37,920

um and the second one is that it's a

1274

00:47:42,150 --> 00:47:40,000

well-known adage that if you get 406

1275

00:47:43,829 --> 00:47:42,160

scientists in a room there will be 407

1276

00:47:45,750 --> 00:47:43,839

different opinions about what's going on

1277

00:47:47,910 --> 00:47:45,760

so i was wondering it's i know it's very

1278

00:47:49,430 --> 00:47:47,920

early but if you have any kind of

1279

00:47:50,549 --> 00:47:49,440

different ideas that are floating around

1280

00:47:53,190 --> 00:47:50,559

about some of the things you're seeing

1281

00:47:56,470 --> 00:47:53,200

in the foreground there

1282

00:47:59,510 --> 00:47:56,480

um it it is uh i i think it is uh still

1283

00:48:00,790 --> 00:47:59,520

early and as you might guess um

1284

00:48:02,790 --> 00:48:00,800

there's only a limited amount of

1285

00:48:06,470 --> 00:48:02,800

information that we can we can draw from

1286

00:48:07,510 --> 00:48:06,480

this and uh and i i think that uh

1287

00:48:09,910 --> 00:48:07,520

uh

1288

00:48:12,470 --> 00:48:09,920

the the team we had a great discussion

1289

00:48:13,430 --> 00:48:12,480

this morning and uh i i think most

1290

00:48:15,990 --> 00:48:13,440

people

1291

00:48:18,710 --> 00:48:16,000

uh felt that we're on a gravel plane of

1292

00:48:20,710 --> 00:48:18,720

mars a somewhat familiar scene but with

1293

00:48:22,470 --> 00:48:20,720

a rather uniform grain size distribution

1294

00:48:24,710 --> 00:48:22,480

this does not look like a ballistic

1295

00:48:27,589 --> 00:48:24,720

impact ejecta for example

1296

00:48:29,349 --> 00:48:27,599

and um is that the rim in the background

1297

00:48:31,510 --> 00:48:29,359

everybody agrees on that

1298

00:48:34,309 --> 00:48:31,520

uh we had a lot of discussion about the

1299

00:48:36,790 --> 00:48:34,319

alluvial fan how we might explore the

1300

00:48:38,630 --> 00:48:36,800

the ellipse and uh

1301

00:48:41,349 --> 00:48:38,640

and discussion about that

1302

00:48:44,549 --> 00:48:41,359

uh i'm i'm kind of amazed with uh we did

1303

00:48:47,190 --> 00:48:44,559

this uh crowdsourcing exercise and

1304

00:48:50,230 --> 00:48:47,200

mapping and uh a bunch of people got

1305

00:48:51,430 --> 00:48:50,240

quads and and we had a remarkable amount

1306

00:48:53,990 --> 00:48:51,440

of agreement

1307

00:48:55,990 --> 00:48:54,000

uh which is probably mostly a testimony

1308

00:48:57,349 --> 00:48:56,000

to to the relative simplicity of the

1309

00:48:58,549 --> 00:48:57,359

geology

1310

00:49:00,230 --> 00:48:58,559

and uh

1311

00:49:02,069 --> 00:49:00,240

and that's a good thing because we're a

1312

00:49:03,510 --> 00:49:02,079

complex spacecraft and and simple

1313

00:49:06,069 --> 00:49:03,520

geology is a good thing to start off

1314

00:49:09,750 --> 00:49:08,069

okay um i know we've had uh you've been

1315

00:49:11,190 --> 00:49:09,760

waiting for oh i'm sorry john johnson is

1316

00:49:12,870 --> 00:49:11,200

next but after that we're going to you

1317

00:49:14,069 --> 00:49:12,880

and then we will go back down that row

1318

00:49:16,309 --> 00:49:14,079

over there and then come back here

1319

00:49:18,390 --> 00:49:16,319

thanks go ahead john thank you i just

1320

00:49:19,510 --> 00:49:18,400

wanted to follow up on the last question

1321

00:49:20,870 --> 00:49:19,520

about the health of the science

1322

00:49:22,710 --> 00:49:20,880

instruments um

1323

00:49:25,030 --> 00:49:22,720

it seems to me the sam instrument with

1324

00:49:26,309 --> 00:49:25,040

all those moving parts is particularly

1325

00:49:28,870 --> 00:49:26,319

well i don't know if delicate's the

1326

00:49:30,710 --> 00:49:28,880

right word but in you say the

1327

00:49:32,870 --> 00:49:30,720

instruments have so far checked out i

1328

00:49:35,270 --> 00:49:32,880

mean can you say anything specifically

1329

00:49:39,349 --> 00:49:35,280

about sam and and whether you feel

1330

00:49:42,309 --> 00:49:40,230

um

1331

00:49:44,390 --> 00:49:42,319

john you want to comment on that yeah

1332

00:49:46,630 --> 00:49:44,400

there's a there's a series of tests uh

1333

00:49:49,670 --> 00:49:46,640

that related to relate to sam's uh

1334

00:49:51,510 --> 00:49:49,680

performance and uh and so today it was a

1335

00:49:53,190 --> 00:49:51,520

electrical test that that worked well

1336

00:49:54,549 --> 00:49:53,200

the first first test and everything

1337

00:49:56,069 --> 00:49:54,559

looked nominal with

1338

00:49:58,150 --> 00:49:56,079

with regard to that

1339

00:49:59,589 --> 00:49:58,160

okay and what happened to that dust

1340

00:50:01,670 --> 00:49:59,599

storm that was talked about a couple

1341

00:50:03,910 --> 00:50:01,680

days ago dissipated

1342

00:50:05,109 --> 00:50:03,920

beautiful clear day okay when we landed

1343

00:50:06,230 --> 00:50:05,119

yeah

1344

00:50:07,829 --> 00:50:06,240

and certainly you're right you know we

1345

00:50:09,109 --> 00:50:07,839

we have not completely checked out all

1346

00:50:10,790 --> 00:50:09,119

the modes of these instruments we first

1347

00:50:13,109 --> 00:50:10,800

do kind of just uh you know electrical

1348

00:50:14,150 --> 00:50:13,119

tests and and basic basic tests of of

1349

00:50:15,829 --> 00:50:14,160

the instruments and there's a lot of

1350

00:50:17,430 --> 00:50:15,839

scientific calibration and a lot of

1351
00:50:19,190 --> 00:50:17,440
extra modes and complex modes of the

1352
00:50:20,790 --> 00:50:19,200
instruments that will take us a long

1353
00:50:21,990 --> 00:50:20,800
time to get through and that's true of

1354
00:50:23,589 --> 00:50:22,000
our own systems you know the drilling

1355
00:50:24,390 --> 00:50:23,599
system the saw spa and all of that so

1356
00:50:25,510 --> 00:50:24,400
you know

1357
00:50:26,710 --> 00:50:25,520
we should not think that we're that

1358
00:50:29,030 --> 00:50:26,720
we're completely out of the water yet

1359
00:50:30,630 --> 00:50:29,040
we've we've got weeks if not months of

1360
00:50:32,470 --> 00:50:30,640
of checkout before we're completely

1361
00:50:35,190 --> 00:50:32,480
confident in the entire payload yeah

1362
00:50:36,710 --> 00:50:35,200
just a little bit more the one major

1363
00:50:39,190 --> 00:50:36,720

observation that we planned today is a

1364

00:50:41,270 --> 00:50:39,200

rad observation for five hours

1365

00:50:43,829 --> 00:50:41,280

and there was plenty of time to do that

1366

00:50:47,510 --> 00:50:43,839

so that's not a check out that's the 100

1367

00:50:52,309 --> 00:50:49,670

hi i'm raphael garcia with volley sao

1368

00:50:55,829 --> 00:50:52,319

paulo brazil my question is for sarah

1369

00:50:57,750 --> 00:50:55,839

is will mro be able to spot the rover in

1370

00:50:59,190 --> 00:50:57,760

the ground even if it's just a single

1371

00:50:59,990 --> 00:50:59,200

pixel and

1372

00:51:02,710 --> 00:51:00,000

uh

1373

00:51:04,790 --> 00:51:02,720

will the arbiter have any role in

1374

00:51:07,190 --> 00:51:04,800

helping the rover navigator part from

1375

00:51:08,630 --> 00:51:07,200

relaying the data

1376
00:51:10,950 --> 00:51:08,640
well uh

1377
00:51:12,790 --> 00:51:10,960
first yes we're going to be able to see

1378
00:51:14,549 --> 00:51:12,800
the rover where um

1379
00:51:17,190 --> 00:51:14,559
we've already got images planned for

1380
00:51:19,430 --> 00:51:17,200
later this week to to look at the rover

1381
00:51:20,950 --> 00:51:19,440
um and they they should

1382
00:51:23,030 --> 00:51:20,960
look great you know it's going to be

1383
00:51:23,910 --> 00:51:23,040
more than just a single pixel

1384
00:51:25,430 --> 00:51:23,920
um

1385
00:51:26,870 --> 00:51:25,440
and

1386
00:51:29,270 --> 00:51:26,880
we are

1387
00:51:32,470 --> 00:51:29,280
we've already done a lot of data

1388
00:51:34,390 --> 00:51:32,480

collection for the rover we've um we've

1389

00:51:36,470 --> 00:51:34,400

mapped out we've collected data across

1390

00:51:38,630 --> 00:51:36,480

the entire gale crater and the landing

1391

00:51:41,190 --> 00:51:38,640

ellipse and we've got stereo data and

1392

00:51:44,150 --> 00:51:41,200

color imagery

1393

00:51:48,150 --> 00:51:44,160

that are have already been used to start

1394

00:51:51,430 --> 00:51:48,160

looking at potential traverses and

1395

00:51:53,349 --> 00:51:51,440

as the mission goes on we are expecting

1396

00:51:55,589 --> 00:51:53,359

msl to come to us and say oh we need a

1397

00:51:58,630 --> 00:51:55,599

new picture there to make sure that

1398

00:52:00,950 --> 00:51:58,640

there's no new dust hazards or you know

1399

00:52:02,950 --> 00:52:00,960

it's a spot that you know maybe you want

1400

00:52:05,829 --> 00:52:02,960

a slightly better resolution at that

1401
00:52:09,109 --> 00:52:05,839
location so we um yes we're in in

1402
00:52:11,510 --> 00:52:09,119
addition to relaying the data um the the

1403
00:52:13,430 --> 00:52:11,520
cameras are expecting to help out

1404
00:52:14,950 --> 00:52:13,440
yeah i would reiterate that the mro data

1405
00:52:16,549 --> 00:52:14,960
that we have has been absolutely

1406
00:52:18,630 --> 00:52:16,559
critical to landing site selection you

1407
00:52:20,390 --> 00:52:18,640
know our ability to find safe flat spots

1408
00:52:22,790 --> 00:52:20,400
with relatively few rocks

1409
00:52:24,630 --> 00:52:22,800
um as mentioned we basically tiled all

1410
00:52:26,309 --> 00:52:24,640
the landing sites with landing you know

1411
00:52:29,270 --> 00:52:26,319
the potential landing ellipses with um

1412
00:52:30,870 --> 00:52:29,280
you know one meter type coverage

1413
00:52:32,549 --> 00:52:30,880

even stereo coverage

1414

00:52:34,069 --> 00:52:32,559

and uh and our rover drivers have

1415

00:52:35,510 --> 00:52:34,079

actually started to use those maps to

1416

00:52:37,510 --> 00:52:35,520

plan out long-term traverses you know

1417

00:52:38,390 --> 00:52:37,520

good candidate traverses and i think

1418

00:52:40,230 --> 00:52:38,400

there's an earlier question about

1419

00:52:41,670 --> 00:52:40,240

driving across dunes versus versus other

1420

00:52:43,270 --> 00:52:41,680

terrain and the rover drivers actually

1421

00:52:44,950 --> 00:52:43,280

have algorithms that say you know it's

1422

00:52:46,549 --> 00:52:44,960

slow to go over dunes or it's dangerous

1423

00:52:49,190 --> 00:52:46,559

and it's fast to go over

1424

00:52:51,349 --> 00:52:49,200

um yeah um you know not non-sandy

1425

00:52:53,829 --> 00:52:51,359

surfaces flat surfaces and so they've

1426
00:52:55,430 --> 00:52:53,839
tried to up present some optimal options

1427
00:52:57,270 --> 00:52:55,440
you know optimal paths to the science

1428
00:52:58,790 --> 00:52:57,280
team to take a look at and they'll be

1429
00:53:00,470 --> 00:52:58,800
working closely with with the science

1430
00:53:02,390 --> 00:53:00,480
team and with john to to come up with

1431
00:53:03,990 --> 00:53:02,400
those with those drives and they're

1432
00:53:07,589 --> 00:53:04,000
up until now basically a hundred percent

1433
00:53:10,470 --> 00:53:07,599
based on uh on high-rise imagery

1434
00:53:12,630 --> 00:53:10,480
uh frank o'brien americaspace.com um so

1435
00:53:14,549 --> 00:53:12,640
now you have two roaring rovers on mars

1436
00:53:15,670 --> 00:53:14,559
and one of them has a tremendous amount

1437
00:53:17,829 --> 00:53:15,680
of data that you're going to be

1438
00:53:19,510 --> 00:53:17,839

expecting every day are you going to be

1439

00:53:21,510 --> 00:53:19,520

getting into situations where you're

1440

00:53:25,589 --> 00:53:21,520

going to have scheduling constraints on

1441

00:53:27,510 --> 00:53:25,599

the orbital relays or the dsn

1442

00:53:29,829 --> 00:53:27,520

no actually the orbiters are able to

1443

00:53:31,990 --> 00:53:29,839

support both in fact um odyssey has two

1444

00:53:34,309 --> 00:53:32,000

partitions that uh that can cover the

1445

00:53:36,309 --> 00:53:34,319

largest paths that either mer or um or

1446

00:53:38,069 --> 00:53:36,319

msl can generate and so we think there's

1447

00:53:40,150 --> 00:53:38,079

very little conflict there

1448

00:53:42,470 --> 00:53:40,160

i just want to add

1449

00:53:44,710 --> 00:53:42,480

there also that the two rovers are in

1450

00:53:47,270 --> 00:53:44,720

different places on in such different

1451
00:53:49,910 --> 00:53:47,280
places that the timing of doing one

1452
00:53:51,349 --> 00:53:49,920
relay it's not going to interfere with

1453
00:53:53,670 --> 00:53:51,359
the other

1454
00:53:55,510 --> 00:53:53,680
okay leo's going to go next and he will

1455
00:53:57,829 --> 00:53:55,520
run that mic down your aisle there okay

1456
00:54:01,030 --> 00:53:57,839
leo go ahead

1457
00:54:04,150 --> 00:54:01,040
tv again i'm sorry if i have to ask mike

1458
00:54:06,950 --> 00:54:04,160
watkins to clarify his clarification

1459
00:54:09,270 --> 00:54:06,960
about the hga deploy you said nine

1460
00:54:11,109 --> 00:54:09,280
o'clock it's just i i can't do it in my

1461
00:54:13,030 --> 00:54:11,119
head the translation

1462
00:54:14,470 --> 00:54:13,040
you said nine o'clock local time for the

1463
00:54:15,829 --> 00:54:14,480

deploy but you're now saying something

1464

00:54:17,349 --> 00:54:15,839

different i wonder what that i said

1465

00:54:19,109 --> 00:54:17,359

afternoon

1466

00:54:20,470 --> 00:54:19,119

before and it actually ends in the early

1467

00:54:22,630 --> 00:54:20,480

afternoon rather than starts in the

1468

00:54:26,069 --> 00:54:22,640

afternoon so it starts around 11 o'clock

1469

00:54:28,150 --> 00:54:26,079

mars time and right now it is about

1470

00:54:30,390 --> 00:54:28,160

it's about 12 hours after landing so

1471

00:54:32,790 --> 00:54:30,400

it's about three o'clock in the morning

1472

00:54:34,870 --> 00:54:32,800

mar on mars right now so he's hours out

1473

00:54:36,630 --> 00:54:34,880

eight or nine hours from now yeah okay

1474

00:54:39,030 --> 00:54:36,640

and if i may just a quick question for

1475

00:54:41,030 --> 00:54:39,040

john grotzinger some light reading

1476

00:54:42,870 --> 00:54:41,040

perhaps since we now are going to get to

1477

00:54:45,430 --> 00:54:42,880

know this crater very well can you

1478

00:54:47,910 --> 00:54:45,440

recommend a paper that would kind of be

1479

00:54:49,109 --> 00:54:47,920

the definitive one to read while we uh

1480

00:54:51,190 --> 00:54:49,119

eat our

1481

00:54:53,430 --> 00:54:51,200

corn flakes

1482

00:54:55,270 --> 00:54:53,440

uh yeah i'm a little bleary and can't

1483

00:54:56,789 --> 00:54:55,280

just recite the references right now but

1484

00:54:58,789 --> 00:54:56,799

there there are some there are several

1485

00:55:00,630 --> 00:54:58,799

review papers that have been written and

1486

00:55:03,109 --> 00:55:00,640

uh if anybody sends me an email i'll be

1487

00:55:05,910 --> 00:55:03,119

happy to send those along

1488

00:55:07,349 --> 00:55:05,920

uh jonathan amos bbc again

1489

00:55:08,630 --> 00:55:07,359

you know the orientation of the rover

1490

00:55:10,230 --> 00:55:08,640

now so you know the orientation of the

1491

00:55:11,990 --> 00:55:10,240

mali camera

1492

00:55:16,390 --> 00:55:12,000

what is going to be in that

1493

00:55:21,829 --> 00:55:20,069

i actually do not know that

1494

00:55:23,670 --> 00:55:21,839

uh that's that's a good question i

1495

00:55:25,750 --> 00:55:23,680

should know the answer to that

1496

00:55:28,470 --> 00:55:25,760

um

1497

00:55:29,430 --> 00:55:28,480

we can quickly tell you that

1498

00:55:30,230 --> 00:55:29,440

yeah

1499

00:55:31,190 --> 00:55:30,240

but

1500

00:55:32,870 --> 00:55:31,200

after it's

1501
00:55:35,030 --> 00:55:32,880
looking out to the side

1502
00:55:36,630 --> 00:55:35,040
and so we had always hoped that the

1503
00:55:37,430 --> 00:55:36,640
rover might land with an orientation

1504
00:55:40,069 --> 00:55:37,440
where

1505
00:55:40,950 --> 00:55:40,079
uh molly might actually capture mount

1506
00:55:43,190 --> 00:55:40,960
sharp

1507
00:55:45,990 --> 00:55:43,200
and it's its potential that it would be

1508
00:55:47,829 --> 00:55:46,000
either oblique or uh toward the crater

1509
00:55:51,190 --> 00:55:47,839
rim i think it's going to be on the

1510
00:55:53,109 --> 00:55:51,200
flanks of of mount sharp and in and

1511
00:55:54,390 --> 00:55:53,119
create a rim

1512
00:55:55,910 --> 00:55:54,400
but it matters a little bit you know we

1513
00:55:58,069 --> 00:55:55,920

have this 112 degree azimuth plus or

1514

00:56:00,069 --> 00:55:58,079

minus 5 degrees or so it matters kind of

1515

00:56:02,309 --> 00:56:00,079

exactly where the how the flanks are and

1516

00:56:03,510 --> 00:56:02,319

where the central peak is and i think we

1517

00:56:04,630 --> 00:56:03,520

probably could get a better answer for

1518

00:56:06,230 --> 00:56:04,640

you uh

1519

00:56:07,589 --> 00:56:06,240

relatively quickly you'll see it

1520

00:56:11,109 --> 00:56:07,599

tomorrow at this time at the press

1521

00:56:16,549 --> 00:56:14,230

hi eric ham with nature again um so

1522

00:56:18,230 --> 00:56:16,559

let's assume that miguel's uh tracking

1523

00:56:19,990 --> 00:56:18,240

data for the moment is correct and that

1524

00:56:22,470 --> 00:56:20,000

you've landed

1525

00:56:23,910 --> 00:56:22,480

two kilometers or so down track a little

1526

00:56:25,109 --> 00:56:23,920

bit closer to mount sharp than you

1527

00:56:27,030 --> 00:56:25,119

expected

1528

00:56:28,309 --> 00:56:27,040

uh so switch on my questions for you

1529

00:56:29,510 --> 00:56:28,319

behind you

1530

00:56:30,549 --> 00:56:29,520

you have where you thought you were

1531

00:56:32,069 --> 00:56:30,559

going to land

1532

00:56:33,190 --> 00:56:32,079

you know the foot of the alluvial fan

1533

00:56:35,190 --> 00:56:33,200

with those interesting thermal

1534

00:56:36,390 --> 00:56:35,200

properties and in front of you is your

1535

00:56:38,309 --> 00:56:36,400

main target

1536

00:56:39,990 --> 00:56:38,319

so are you going to go in reverse are

1537

00:56:42,630 --> 00:56:40,000

you going to go ahead

1538

00:56:45,670 --> 00:56:42,640

well i i you know the the boundary

1539

00:56:49,349 --> 00:56:45,680

between where the alluvial fan ends and

1540

00:56:51,670 --> 00:56:49,359

the base amount sharp is is diffuse

1541

00:56:54,150 --> 00:56:51,680

all alluvial fans ultimately taper out

1542

00:56:55,910 --> 00:56:54,160

and they they find in grain size

1543

00:56:57,750 --> 00:56:55,920

and and we really want to be on the

1544

00:56:59,589 --> 00:56:57,760

downslope side of that if that's what's

1545

00:57:01,589 --> 00:56:59,599

going on there so

1546

00:57:04,309 --> 00:57:01,599

what we're the goal of the crowd

1547

00:57:07,510 --> 00:57:04,319

sourcing mapping exercise was to be able

1548

00:57:10,150 --> 00:57:07,520

to compile a map that that made a first

1549

00:57:13,990 --> 00:57:10,160

crack at sort of units different types

1550

00:57:16,870 --> 00:57:14,000

of geological units but also iding key

1551
00:57:18,470 --> 00:57:16,880
bits of outcrop maybe the height of of

1552
00:57:20,789 --> 00:57:18,480
the podium here

1553
00:57:22,630 --> 00:57:20,799
a meter two meters maybe three meters

1554
00:57:24,950 --> 00:57:22,640
that things that would would that

1555
00:57:27,910 --> 00:57:24,960
constituted part of that one percent edl

1556
00:57:29,910 --> 00:57:27,920
risk that's what we're after and so what

1557
00:57:31,589 --> 00:57:29,920
we would do is string together a pathway

1558
00:57:33,270 --> 00:57:31,599
that would link us between these and if

1559
00:57:35,349 --> 00:57:33,280
it takes us back towards the fan then

1560
00:57:38,069 --> 00:57:35,359
we'll go that way and if it takes us

1561
00:57:39,990 --> 00:57:38,079
forward then we'll go that way too so

1562
00:57:42,230 --> 00:57:40,000
you know most geological mapping

1563
00:57:43,910 --> 00:57:42,240

exercises do not involve a traverse in

1564

00:57:45,750 --> 00:57:43,920

just one straight direction and our goal

1565

00:57:47,910 --> 00:57:45,760

is not just to head for the hills what

1566

00:57:49,510 --> 00:57:47,920

are the size of these uh boulders that

1567

00:57:50,950 --> 00:57:49,520

you want to string together

1568

00:57:53,190 --> 00:57:50,960

uh well you know each one of these

1569

00:57:56,390 --> 00:57:53,200

quadrangles is roughly about one and a

1570

00:57:58,789 --> 00:57:56,400

half kilometers on a side and within

1571

00:57:59,829 --> 00:57:58,799

every one of them there is some kind of

1572

00:58:01,589 --> 00:57:59,839

a scarp

1573

00:58:04,549 --> 00:58:01,599

and so what we're trying to do is to

1574

00:58:06,470 --> 00:58:04,559

piece together a stratigraphic section

1575

00:58:08,630 --> 00:58:06,480

of the landing ellipse

1576
00:58:11,510 --> 00:58:08,640
using the mapping is an efficient way to

1577
00:58:13,109 --> 00:58:11,520
go around and check all of the points

1578
00:58:14,630 --> 00:58:13,119
that would contribute towards that

1579
00:58:16,150 --> 00:58:14,640
stratigraphy

1580
00:58:17,430 --> 00:58:16,160
and uh

1581
00:58:18,390 --> 00:58:17,440
probably

1582
00:58:20,470 --> 00:58:18,400
speaking you said you were trying to

1583
00:58:21,910 --> 00:58:20,480
string together certain objects

1584
00:58:25,430 --> 00:58:21,920
in your path what are those options we

1585
00:58:27,030 --> 00:58:25,440
don't know yet stay tuned yeah

1586
00:58:29,750 --> 00:58:27,040
okay

1587
00:58:31,990 --> 00:58:29,760
guy norris from aviation week uh i'm not

1588
00:58:34,390 --> 00:58:32,000

sure who exactly can handle this space

1589

00:58:36,390 --> 00:58:34,400

but um under the

1590

00:58:38,069 --> 00:58:36,400

nominal uh commissioning

1591

00:58:38,950 --> 00:58:38,079

uh schedule that you do have at the

1592

00:58:41,349 --> 00:58:38,960

moment

1593

00:58:44,390 --> 00:58:41,359

when could we expect the first motion

1594

00:58:46,069 --> 00:58:44,400

for the vehicle to be commanded and um

1595

00:58:47,829 --> 00:58:46,079

secondly really is the vehicle at the

1596

00:58:50,150 --> 00:58:47,839

moment they're over does it is it

1597

00:58:52,230 --> 00:58:50,160

configured essentially how the model is

1598

00:58:54,710 --> 00:58:52,240

right now with the uh center set of

1599

00:58:55,829 --> 00:58:54,720

wheels in the stowed position

1600

00:58:58,150 --> 00:58:55,839

thanks

1601

00:59:00,309 --> 00:58:58,160

um so it is no it's actually seeing it's

1602

00:59:01,910 --> 00:59:00,319

sitting flat right now so it hears up on

1603

00:59:03,670 --> 00:59:01,920

a podium it's actually sitting quite you

1604

00:59:04,470 --> 00:59:03,680

know it's sitting quite flat like this

1605

00:59:07,510 --> 00:59:04,480

now

1606

00:59:09,030 --> 00:59:07,520

uh with the with the rsm down and the hd

1607

00:59:10,789 --> 00:59:09,040

about to come out so it's sitting i

1608

00:59:12,789 --> 00:59:10,799

can't lift it up without the with the

1609

00:59:15,109 --> 00:59:12,799

system changing but it's

1610

00:59:16,870 --> 00:59:15,119

going to do it this way

1611

00:59:18,470 --> 00:59:16,880

right it's it's sitting quite flat now

1612

00:59:20,390 --> 00:59:18,480

as far as we can tell we do within you

1613

00:59:22,549 --> 00:59:20,400

know a couple of degrees right

1614

00:59:27,109 --> 00:59:22,559

um and what was the other question first

1615

00:59:28,630 --> 00:59:27,119

drive uh i would say a couple of weeks

1616

00:59:30,789 --> 00:59:28,640

is

1617

00:59:32,390 --> 00:59:30,799

a good number for that

1618

00:59:39,510 --> 00:59:32,400

and it will be quite a short drive you

1619

00:59:43,030 --> 00:59:40,950

scientists i have a question for sarah

1620

00:59:45,190 --> 00:59:43,040

and then one for everyone here um will

1621

00:59:46,470 --> 00:59:45,200

highrise be able to see the craters of

1622

00:59:50,309 --> 00:59:46,480

the ballast made

1623

00:59:50,319 --> 00:59:54,309

i'm not sure

1624

00:59:57,349 --> 00:59:56,069

we are

1625

00:59:59,430 --> 00:59:57,359

going to be

1626

01:00:03,030 --> 00:59:59,440

looking for the various hardware

1627

01:00:04,150 --> 01:00:03,040

components in future images and

1628

01:00:05,589 --> 01:00:04,160

you know i

1629

01:00:07,190 --> 01:00:05,599

don't know i don't know what we're going

1630

01:00:09,030 --> 01:00:07,200

to see

1631

01:00:10,870 --> 01:00:09,040

and then for all of you i heard you're

1632

01:00:12,950 --> 01:00:10,880

going to be living on mars time for the

1633

01:00:15,109 --> 01:00:12,960

first 90 souls is that right

1634

01:00:17,910 --> 01:00:15,119

um and how come only for 90 souls and

1635

01:00:18,789 --> 01:00:17,920

then what happens after that

1636

01:00:20,549 --> 01:00:18,799

well

1637

01:00:22,549 --> 01:00:20,559

that's a good question that yeah that's

1638

01:00:24,150 --> 01:00:22,559

a good question uh and and i'll answer

1639

01:00:25,990 --> 01:00:24,160

that i was joking with with gentry just

1640

01:00:27,670 --> 01:00:26,000

before this that you can tell who was

1641

01:00:30,630 --> 01:00:27,680

working on a mars time here at night but

1642

01:00:32,549 --> 01:00:30,640

who's still wearing the landing shirt

1643

01:00:34,230 --> 01:00:32,559

john

1644

01:00:35,589 --> 01:00:34,240

um

1645

01:00:36,390 --> 01:00:35,599

you know the thing about these missions

1646

01:00:39,750 --> 01:00:36,400

are

1647

01:00:42,470 --> 01:00:39,760

have to learn how to use this very

1648

01:00:43,990 --> 01:00:42,480

complicated machine that we've built

1649

01:00:45,829 --> 01:00:44,000

and it's in a new environment and it

1650

01:00:47,589 --> 01:00:45,839

behaves differently than than it did in

1651

01:00:48,870 --> 01:00:47,599

the test bed here you know it's got

1652

01:00:51,270 --> 01:00:48,880

different gravity it's got different

1653

01:00:52,630 --> 01:00:51,280

temperatures it's got everything

1654

01:00:54,230 --> 01:00:52,640

you know different from exactly the way

1655

01:00:55,430 --> 01:00:54,240

we tested it and we tested a range of

1656

01:00:56,870 --> 01:00:55,440

activities but you have to find out

1657

01:00:59,190 --> 01:00:56,880

exactly how it's going to behave when

1658

01:01:00,789 --> 01:00:59,200

you're when you're at mars

1659

01:01:02,309 --> 01:01:00,799

and and we need to get comfortable with

1660

01:01:03,990 --> 01:01:02,319

that we need to do that efficiently so

1661

01:01:05,589 --> 01:01:04,000

we want to run through our paces in an

1662

01:01:07,990 --> 01:01:05,599

efficient way

1663

01:01:11,349 --> 01:01:08,000

and by working mars time and it gives us

1664

01:01:13,109 --> 01:01:11,359

basically 16 hours to plan an uplink

1665

01:01:14,069 --> 01:01:13,119

while the rover is sleeping at night on

1666

01:01:16,150 --> 01:01:14,079

mars

1667

01:01:17,910 --> 01:01:16,160

so so we can take a long time and of

1668

01:01:19,589 --> 01:01:17,920

course if we don't rotate with the mars

1669

01:01:21,670 --> 01:01:19,599

day and night then we start to lose time

1670

01:01:24,390 --> 01:01:21,680

we start to lose that that ability to to

1671

01:01:26,470 --> 01:01:24,400

keep track of of the mars night while we

1672

01:01:29,270 --> 01:01:26,480

were working

1673

01:01:30,789 --> 01:01:29,280

now that that is to help us be efficient

1674

01:01:32,150 --> 01:01:30,799

in checking out the vehicle but there's

1675

01:01:33,829 --> 01:01:32,160

another complex thing that we have to

1676

01:01:35,710 --> 01:01:33,839

learn and that's how to operate with

1677

01:01:37,910 --> 01:01:35,720

ourselves we have

1678

01:01:40,150 --> 01:01:37,920

420 people or something i forget the

1679

01:01:43,109 --> 01:01:40,160

number john

1680

01:01:45,829 --> 01:01:43,119

yeah 400 scientists on the mission and

1681

01:01:47,510 --> 01:01:45,839

another 300 or more engineers on the

1682

01:01:49,109 --> 01:01:47,520

mission so we have something like 700 or

1683

01:01:51,030 --> 01:01:49,119

800 people

1684

01:01:52,710 --> 01:01:51,040

learning to operate this vehicle

1685

01:01:54,230 --> 01:01:52,720

and we have to know how to interact with

1686

01:01:55,910 --> 01:01:54,240

ourselves we have to know each other's

1687

01:01:57,029 --> 01:01:55,920

voices we have to know how each other

1688

01:01:57,910 --> 01:01:57,039

operates and we have to learn each

1689

01:02:00,150 --> 01:01:57,920

other's

1690

01:02:02,470 --> 01:02:00,160

individual specialized skills so that we

1691

01:02:04,150 --> 01:02:02,480

can get more efficient in the future

1692

01:02:05,990 --> 01:02:04,160

so after this 90 day period we get to

1693

01:02:07,109 --> 01:02:06,000

know each other very well then we can

1694

01:02:08,630 --> 01:02:07,119

send folks back to their home

1695

01:02:10,150 --> 01:02:08,640

institution and go back to france and go

1696

01:02:12,069 --> 01:02:10,160

back to spain and go back to goddard and

1697

01:02:13,270 --> 01:02:12,079

go back to places like that work a more

1698

01:02:15,270 --> 01:02:13,280

normal time

1699

01:02:17,349 --> 01:02:15,280

operate by the internet operate by

1700

01:02:19,109 --> 01:02:17,359

telecon and we know those people and

1701

01:02:20,549 --> 01:02:19,119

they know us and they know the rover

1702

01:02:22,789 --> 01:02:20,559

they know the software systems and we'll

1703

01:02:24,390 --> 01:02:22,799

be much more efficient so this is really

1704

01:02:25,349 --> 01:02:24,400

kind of a you know uh

1705

01:02:31,349 --> 01:02:25,359

uh

1706

01:02:33,829 --> 01:02:31,359

learning both how to operate the vehicle

1707

01:02:35,510 --> 01:02:33,839

and and how to interact with each other

1708

01:02:38,150 --> 01:02:35,520

let me just add one more thing to that

1709

01:02:41,430 --> 01:02:38,160

as if uh it wasn't challenging enough to

1710

01:02:43,750 --> 01:02:41,440

work on mars time on mer

1711

01:02:45,910 --> 01:02:43,760

at the end of the saw we have a

1712

01:02:48,069 --> 01:02:45,920

x-band link to earth to send all the

1713

01:02:51,029 --> 01:02:48,079

critical data back

1714

01:02:52,150 --> 01:02:51,039

and that could be scheduled exactly on

1715

01:02:53,990 --> 01:02:52,160

on time

1716

01:02:57,109 --> 01:02:54,000

on on this mission because of the larger

1717

01:02:58,789 --> 01:02:57,119

data volume we need to grab an mro or an

1718

01:03:00,950 --> 01:02:58,799

odyssey pass

1719

01:03:03,349 --> 01:03:00,960

and so you the way to think about it is

1720

01:03:06,150 --> 01:03:03,359

a mars time rotation of 39 minutes every

1721

01:03:08,230 --> 01:03:06,160

day but now add plus or minus an hour

1722

01:03:09,829 --> 01:03:08,240

and a half to randomize your schedule

1723

01:03:11,430 --> 01:03:09,839

just to make sure that anybody you

1724

01:03:15,990 --> 01:03:11,440

wanted to have a relationship here on

1725

01:03:18,470 --> 01:03:17,270

it's also great the way we're starting

1726
01:03:19,589 --> 01:03:18,480
you know people talk about it being like

1727
01:03:23,109 --> 01:03:19,599
jet lag

1728
01:03:25,349 --> 01:03:23,119
certain sense we're off by by you know

1729
01:03:26,710 --> 01:03:25,359
12 hours now except that it's also

1730
01:03:28,230 --> 01:03:26,720
daylight when you're trying to sleep so

1731
01:03:29,670 --> 01:03:28,240
at least when you fly to another country

1732
01:03:30,710 --> 01:03:29,680
and you have jet lag it's night time and

1733
01:03:33,109 --> 01:03:30,720
you're trying to go to sleep at night

1734
01:03:34,470 --> 01:03:33,119
and here we were exactly out of sync so

1735
01:03:36,470 --> 01:03:34,480
so we're starting off in kind of the

1736
01:03:37,910 --> 01:03:36,480
worst time but uh but it should actually

1737
01:03:40,309 --> 01:03:37,920
get a little easier here over the next

1738
01:03:42,309 --> 01:03:40,319

uh next few weeks

1739

01:03:43,510 --> 01:03:42,319

okay uh henry has a microphone and then

1740

01:03:45,510 --> 01:03:43,520

i know there are a few questions coming

1741

01:03:47,589 --> 01:03:45,520

forward again so go ahead henry

1742

01:03:49,109 --> 01:03:47,599

question uh henry bortmann astro biology

1743

01:03:52,069 --> 01:03:49,119

magazine quick question about the

1744

01:03:54,789 --> 01:03:52,079

martian calendar does sol zero start at

1745

01:03:59,190 --> 01:03:54,799

touchdown or at local midnight at the

1746

01:03:59,200 --> 01:04:03,029

local midnight

1747

01:04:07,750 --> 01:04:05,430

uh someone else on this end um todd and

1748

01:04:09,910 --> 01:04:07,760

then we'll just keep moving forward

1749

01:04:12,870 --> 01:04:09,920

um todd halverson of florida today in

1750

01:04:15,430 --> 01:04:12,880

usa today i might have missed this but

1751

01:04:18,630 --> 01:04:15,440

um could you tell us what configuration

1752

01:04:19,430 --> 01:04:18,640

the vehicle is in in the picture behind

1753

01:04:22,230 --> 01:04:19,440

you

1754

01:04:25,190 --> 01:04:22,240

is the heat shield still on there and is

1755

01:04:27,270 --> 01:04:25,200

that what the white albedo is there

1756

01:04:30,549 --> 01:04:27,280

and i was also wondering if you could

1757

01:04:33,109 --> 01:04:30,559

address the historic nature of uh

1758

01:04:34,630 --> 01:04:33,119

of what went on last night and how you

1759

01:04:35,750 --> 01:04:34,640

think this will be

1760

01:04:38,069 --> 01:04:35,760

viewed

1761

01:04:41,109 --> 01:04:38,079

10 years from now 20 years from now 50

1762

01:04:42,069 --> 01:04:41,119

years from now thanks uh

1763

01:04:51,029 --> 01:04:42,079

i

1764

01:04:51,039 --> 01:04:55,349

we don't know for sure yet

1765

01:04:59,589 --> 01:04:57,750

but by time i mean

1766

01:05:02,069 --> 01:04:59,599

yeah we need to do the reconstruction i

1767

01:05:03,589 --> 01:05:02,079

think i think the white thing steve yeah

1768

01:05:04,870 --> 01:05:03,599

yeah that's the back shelf

1769

01:05:06,549 --> 01:05:04,880

you're looking at the top of the back

1770

01:05:07,910 --> 01:05:06,559

shelf right there would be underneath so

1771

01:05:09,990 --> 01:05:07,920

it's not easy to see these images

1772

01:05:11,349 --> 01:05:10,000

whether or not it's off or not so

1773

01:05:15,109 --> 01:05:11,359

we'd only know by timing and we don't

1774

01:05:19,430 --> 01:05:17,270

i'm from a

1775

01:05:21,270 --> 01:05:19,440

i mean from a philosophical point of

1776

01:05:23,829 --> 01:05:21,280

view i mean the fact that we see

1777

01:05:25,910 --> 01:05:23,839

ourselves arriving to another

1778

01:05:27,910 --> 01:05:25,920

planet you know just like phoenix did

1779

01:05:29,990 --> 01:05:27,920

first i mean it's just mind-boggling to

1780

01:05:31,670 --> 01:05:30,000

me i think to out to all of us so i mean

1781

01:05:36,230 --> 01:05:31,680

i cannot say more than that it's just

1782

01:05:40,230 --> 01:05:38,470

move forward one more here

1783

01:05:41,829 --> 01:05:40,240

uh kelly b sky and telescope i was

1784

01:05:44,870 --> 01:05:41,839

outside for a bit so i apologize if this

1785

01:05:46,150 --> 01:05:44,880

has been asked 140 gram kilograms of

1786

01:05:48,950 --> 01:05:46,160

hydrazine

1787

01:05:51,589 --> 01:05:48,960

is that a concern did you have the

1788

01:05:53,109 --> 01:05:51,599

flyway be in the downwind prevailing

1789

01:05:54,789 --> 01:05:53,119

wind direction can you talk to that a

1790

01:05:56,710 --> 01:05:54,799

bit

1791

01:05:58,390 --> 01:05:56,720

well

1792

01:06:00,789 --> 01:05:58,400

i could not tell you about the wind i

1793

01:06:03,270 --> 01:06:00,799

mean it was the choice to to fly it as

1794

01:06:05,750 --> 01:06:03,280

far as possible

1795

01:06:06,470 --> 01:06:05,760

well it's the direction is i said we

1796

01:06:09,349 --> 01:06:06,480

have

1797

01:06:10,870 --> 01:06:09,359

limited control okay so it's you draw a

1798

01:06:13,589 --> 01:06:10,880

line east-west

1799

01:06:16,309 --> 01:06:13,599

and fly north of that line depending on

1800

01:06:18,470 --> 01:06:16,319

what orientation the descent stage

1801

01:06:20,630 --> 01:06:18,480

it's uh it finds itself

1802

01:06:21,750 --> 01:06:20,640

the reason for that is that we do a

1803

01:06:42,950 --> 01:06:21,760

a

1804

01:06:46,789 --> 01:06:42,960

so

1805

01:06:49,510 --> 01:06:46,799

choices either go that way or that way

1806

01:06:50,870 --> 01:06:49,520

and so we choose the one that goes

1807

01:06:52,630 --> 01:06:50,880

north

1808

01:06:55,910 --> 01:06:52,640

okay so when we do our simulations

1809

01:06:59,190 --> 01:06:55,920

you'll see a whole bunch of dots

1810

01:07:03,670 --> 01:06:59,200

on the north northern hemisphere of the

1811

01:07:06,630 --> 01:07:03,680

of of of the two north quadrants

1812

01:07:09,190 --> 01:07:06,640

of so that's that's what we do now that

1813

01:07:11,589 --> 01:07:09,200

was picked up between the scientists

1814

01:07:12,710 --> 01:07:11,599

and the engineers looking for all the

1815

01:07:16,710 --> 01:07:12,720

conditions

1816

01:07:20,870 --> 01:07:19,109

okay let's go to irene again

1817

01:07:22,549 --> 01:07:20,880

oh i'm sorry you know irene kicked the

1818

01:07:24,470 --> 01:07:22,559

mic but we have a question back here

1819

01:07:26,950 --> 01:07:24,480

first that we'll take thank you jackie

1820

01:07:29,029 --> 01:07:26,960

goddard for the times of london um i

1821

01:07:30,270 --> 01:07:29,039

just wanted to clarify first with sarah

1822

01:07:33,430 --> 01:07:30,280

when you say

1823

01:07:35,750 --> 01:07:33,440

340 kilometers away

1824

01:07:38,870 --> 01:07:35,760

uh that that image was taken is that

1825

01:07:40,950 --> 01:07:38,880

direct uh vertical altitude and then my

1826

01:07:44,150 --> 01:07:40,960

second question just um from mike

1827

01:07:46,069 --> 01:07:44,160

watkins to the untrained eye um these

1828

01:07:49,670 --> 01:07:46,079

are pictures of black and white pictures

1829

01:07:51,470 --> 01:07:49,680

of of gravel um to the trained eye can

1830

01:07:54,309 --> 01:07:51,480

you sum up just how

1831

01:07:58,069 --> 01:07:54,319

sophisticated and exciting and momentous

1832

01:08:03,430 --> 01:07:59,670

okay the um

1833

01:08:07,829 --> 01:08:03,440

it's the 340 kilometers is line of sight

1834

01:08:09,430 --> 01:08:07,839

so it's not i think yeah we were

1835

01:08:12,549 --> 01:08:09,440

we were almost

1836

01:08:15,270 --> 01:08:12,559

directly overhead i think we had a very

1837

01:08:19,749 --> 01:08:15,280

very small angle it was but it was it

1838

01:08:23,749 --> 01:08:21,669

um i'll take a crack at the photos and

1839

01:08:25,110 --> 01:08:23,759

i'll let john

1840

01:08:27,510 --> 01:08:25,120

take a better crack from the scientific

1841

01:08:29,510 --> 01:08:27,520

perspective you know you know to me it

1842

01:08:31,110 --> 01:08:29,520

it's representative of

1843

01:08:33,990 --> 01:08:31,120

of of course a successful landing on

1844

01:08:36,950 --> 01:08:34,000

mars it's representative of

1845

01:08:39,110 --> 01:08:36,960

of a new home of of further over it's

1846

01:08:41,590 --> 01:08:39,120

representative of of a new mars that we

1847

01:08:43,430 --> 01:08:41,600

have never seen before and so every one

1848

01:08:46,950 --> 01:08:43,440

of those pictures is the most beautiful

1849

01:08:51,349 --> 01:08:48,630

i think john would say this better than

1850

01:08:53,829 --> 01:08:51,359

i would that if those if those pieces of

1851

01:08:55,510 --> 01:08:53,839

gravel are transported by water on mars

1852

01:08:57,110 --> 01:08:55,520

and ancient mars then they're much more

1853

01:08:58,630 --> 01:08:57,120

than gravel but john you should pick up

1854

01:09:00,070 --> 01:08:58,640

from there

1855

01:09:00,870 --> 01:09:00,080

thanks for setting me up

1856

01:09:02,149 --> 01:09:00,880

uh

1857

01:09:04,070 --> 01:09:02,159

you know i

1858

01:09:06,229 --> 01:09:04,080

uh a minute ago there was a there was a

1859

01:09:10,149 --> 01:09:06,239

question down here about about what this

1860

01:09:11,910 --> 01:09:10,159

this mission means to you and uh and i

1861

01:09:13,269 --> 01:09:11,920

i think for us at this point as

1862

01:09:15,189 --> 01:09:13,279

scientists

1863

01:09:17,829 --> 01:09:15,199

we haven't even scratched the surface

1864

01:09:19,910 --> 01:09:17,839

and and really what's amazing about it

1865

01:09:21,510 --> 01:09:19,920

is the miracle of this engineering

1866

01:09:23,189 --> 01:09:21,520

that's all you can do is sit there as a

1867

01:09:24,789 --> 01:09:23,199

member of the science team and don

1868

01:09:26,070 --> 01:09:24,799

hassler is a pi the rad instrument he's

1869

01:09:29,030 --> 01:09:26,080

sitting behind you there he's not in his

1870

01:09:31,349 --> 01:09:29,040

head it is a miracle to us that we have

1871

01:09:33,430 --> 01:09:31,359

chosen this place as a result of

1872

01:09:35,349 --> 01:09:33,440

scientific deliberation

1873

01:09:36,709 --> 01:09:35,359

this edl system

1874

01:09:39,269 --> 01:09:36,719

for the first time in the history of

1875

01:09:41,829 --> 01:09:39,279

land admissions allowed the science

1876

01:09:43,590 --> 01:09:41,839

community to choose between four options

1877

01:09:45,349 --> 01:09:43,600

none were excluded by engineering the

1878

01:09:47,030 --> 01:09:45,359

final four was a debate

1879

01:09:49,430 --> 01:09:47,040

of of scientists that like different

1880

01:09:51,910 --> 01:09:49,440

flavors of chocolate and vanilla

1881

01:09:55,510 --> 01:09:51,920

and and then when it comes down to

1882

01:09:57,590 --> 01:09:55,520

creating a a priority of of images to

1883

01:09:59,990 --> 01:09:57,600

downlink and you have your choice of the

1884

01:10:01,750 --> 01:10:00,000

front haz cam and the rear has cam the

1885

01:10:03,030 --> 01:10:01,760

most amazing thing about it to get back

1886

01:10:04,470 --> 01:10:03,040

to one of the things that emily was

1887

01:10:06,390 --> 01:10:04,480

pointing at you have a group of

1888

01:10:08,149 --> 01:10:06,400

engineers and a group of scientists and

1889

01:10:10,310 --> 01:10:08,159

here's what happened

1890

01:10:13,030 --> 01:10:10,320

jennifer trospen comes up to me and says

1891

01:10:15,110 --> 01:10:13,040

john we we really need to get the

1892

01:10:16,550 --> 01:10:15,120

engineering state of health data down

1893

01:10:18,070 --> 01:10:16,560

that's a top priority and i said of

1894

01:10:20,070 --> 01:10:18,080

course i agree

1895

01:10:22,070 --> 01:10:20,080

and we think we might be able to sneak

1896

01:10:24,070 --> 01:10:22,080

in an image what would be your first

1897

01:10:26,070 --> 01:10:24,080

choice would it be the front haz cam or

1898

01:10:28,950 --> 01:10:26,080

the rear haz cam

1899

01:10:31,189 --> 01:10:28,960

and all of the scientists

1900

01:10:32,709 --> 01:10:31,199

wanted the rear haz cam

1901

01:10:34,870 --> 01:10:32,719

and all the engineers wanted the front

1902

01:10:36,390 --> 01:10:34,880

has cam and the reason for that is they

1903

01:10:37,750 --> 01:10:36,400

said well there's no obstructions in the

1904

01:10:39,510 --> 01:10:37,760

way the wheels aren't in the way it's

1905

01:10:41,350 --> 01:10:39,520

the most open view of the terrain isn't

1906

01:10:43,030 --> 01:10:41,360

that what you would want and all the

1907

01:10:44,630 --> 01:10:43,040

scientists said no we want to see the

1908

01:10:46,229 --> 01:10:44,640

wheel on the ground because this is not

1909

01:10:48,310 --> 01:10:46,239

a moment for science it's a moment for

1910

01:10:50,229 --> 01:10:48,320

engineering and when you see that wheel

1911

01:10:52,870 --> 01:10:50,239

on the ground you know you've landed on

1912

01:10:54,870 --> 01:10:52,880

mars no semaphore tones no people

1913

01:10:56,310 --> 01:10:54,880

jumping up and down you actually see a

1914

01:10:58,149 --> 01:10:56,320

picture of the surface of the planet

1915

01:11:03,750 --> 01:10:58,159

with a spacecraft on it and that is the

1916

01:11:08,550 --> 01:11:06,070

thoughts with the reuters um i'm not

1917

01:11:10,470 --> 01:11:08,560

sure who to ask this to and please don't

1918

01:11:12,310 --> 01:11:10,480

laugh if it's really silly but with the

1919

01:11:14,630 --> 01:11:12,320

nuclear power source could you just

1920

01:11:17,430 --> 01:11:14,640

explain a little bit about why uh

1921

01:11:20,149 --> 01:11:17,440

daytime and nighttime and rover sleep is

1922

01:11:22,390 --> 01:11:20,159

is important or a factor

1923

01:11:25,189 --> 01:11:22,400

um sure and it's maybe not quite as

1924

01:11:28,070 --> 01:11:25,199

obvious as is it's certainly not a silly

1925

01:11:31,110 --> 01:11:28,080

question at all so the the rtg generates

1926

01:11:33,510 --> 01:11:31,120

just a little bit of electricity

1927

01:11:36,070 --> 01:11:33,520

and we think of it as a as a trickle

1928

01:11:38,950 --> 01:11:36,080

charger of our batteries and we are

1929

01:11:40,390 --> 01:11:38,960

always operating on the batteries

1930

01:11:42,470 --> 01:11:40,400

during the day and at night we're

1931

01:11:44,390 --> 01:11:42,480

trickle charging them back

1932

01:11:46,790 --> 01:11:44,400

the other big advantage is it generates

1933

01:11:48,790 --> 01:11:46,800

a lot of heat most of what the rtg

1934

01:11:50,149 --> 01:11:48,800

generates is heat

1935

01:11:51,750 --> 01:11:50,159

we take a little bit of that heat with a

1936

01:11:55,910 --> 01:11:51,760

thermocouple and make a little bit of

1937

01:11:58,229 --> 01:11:55,920

electricity you know a 100 watts or so

1938

01:11:59,910 --> 01:11:58,239

but that heat keeps us warm it prevents

1939

01:12:02,070 --> 01:11:59,920

us from having to use a lot of heaters

1940

01:12:03,350 --> 01:12:02,080

electrical heaters for for warmth so you

1941

01:12:05,189 --> 01:12:03,360

know we circulate

1942

01:12:06,470 --> 01:12:05,199

fluid a fluid loop you know you think of

1943

01:12:07,430 --> 01:12:06,480

it like a freon loop or something an air

1944

01:12:09,510 --> 01:12:07,440

conditioner

1945

01:12:11,750 --> 01:12:09,520

to take that heat and and and pump it

1946

01:12:12,709 --> 01:12:11,760

around the rover body and keep the rover

1947

01:12:14,950 --> 01:12:12,719

warm

1948

01:12:16,470 --> 01:12:14,960

so uh you know we still need that that

1949

01:12:17,830 --> 01:12:16,480

that's where most of the energy goes and

1950

01:12:19,110 --> 01:12:17,840

the rest of it trickle charges our

1951

01:12:20,390 --> 01:12:19,120

batteries and we use the batteries

1952

01:12:22,550 --> 01:12:20,400

during the day

1953

01:12:24,310 --> 01:12:22,560

and that's not a as big limitation as

1954

01:12:25,750 --> 01:12:24,320

you think because of course we we want

1955

01:12:26,870 --> 01:12:25,760

to take pictures and we want to see what

1956

01:12:28,390 --> 01:12:26,880

we're doing and we want to look at the

1957

01:12:29,669 --> 01:12:28,400

workspace and look at rocks and pick

1958

01:12:31,910 --> 01:12:29,679

targets out and you want to do those

1959

01:12:33,830 --> 01:12:31,920

things during the day and not at night

1960

01:12:35,110 --> 01:12:33,840

it's warmer during the day so it really

1961

01:12:36,709 --> 01:12:35,120

fits pretty naturally that the

1962

01:12:39,030 --> 01:12:36,719

operations concept that you that you'd

1963

01:12:40,870 --> 01:12:39,040

want to do

1964

01:12:42,390 --> 01:12:40,880

all right we're going to end the press

1965

01:12:43,750 --> 01:12:42,400

briefing for today of course those of

1966

01:12:46,310 --> 01:12:43,760

you in the room can come up and ask some

1967

01:12:48,709 --> 01:12:46,320

more questions afterwards as a reminder

1968

01:12:49,990 --> 01:12:48,719

i already mentioned 4 o'clock today we

1969

01:12:52,790 --> 01:12:50,000

hope to do that follow-up news

1970

01:12:55,270 --> 01:12:52,800

conference with marty images after today

1971

01:12:57,590 --> 01:12:55,280

we will do daily 10 a.m news conferences

1972

01:12:58,950 --> 01:12:57,600

so please join us for those and

1973

01:13:01,590 --> 01:12:58,960

if you want to stay in your seats we're

1974

01:13:03,510 --> 01:13:01,600

going to take one look again at what it

1975

01:13:04,870 --> 01:13:03,520

was like in mission control last night

1976

01:13:15,910 --> 01:13:04,880
at 10 30.

1977

01:13:22,149 --> 01:13:18,470
things are looking good coming up on the

1978

01:13:22,159 --> 01:13:27,510
we'll report sentry interface

1979

01:13:30,070 --> 01:13:28,950
we're not beginning to feel the

1980

01:13:32,950 --> 01:13:30,080
atmosphere

1981

01:13:35,510 --> 01:13:32,960
as we go in here uh it is reporting that

1982

01:13:39,430 --> 01:13:35,520
we are seeing g's on the order of uh 11

1983

01:13:42,390 --> 01:13:41,110
2 is starting

1984

01:13:46,470 --> 01:13:42,400
we are now getting telemetry from

1985

01:13:53,270 --> 01:13:47,830
we should have parachute deploy around

1986

01:13:53,280 --> 01:13:56,470
the parachute is deployed

1987

01:13:56,480 --> 01:14:01,990
we are decelerating

1988

01:14:08,470 --> 01:14:03,590

we're down to 90 meters per second at an

1989

01:14:08,480 --> 01:14:14,870

standing by for bachelor separation

1990

01:14:14,880 --> 01:14:21,990

we are in powered flight

1991

01:14:25,910 --> 01:14:23,270

we're an altitude of one kilometer

1992

01:14:25,920 --> 01:14:34,550

standing by

1993

01:14:34,560 --> 01:14:43,510

you remain strong

1994

01:14:43,520 --> 01:15:08,830

touchdown confirmed

1995

01:15:08,840 --> 01:15:53,510

magic you got a thumbnail

1996

01:15:53,520 --> 01:16:19,270

team