
EXIT
NASA
National Aeronautics and Space Administration
Jet Propulsion Laboratory
California Institute of Technology
Mike Watkins
Mike Malin
Diane Trautman
Andy Mishkin

1
00:00:08,419 --> 00:00:05,960
welcome to NASA's Jet Propulsion

2
00:00:10,820 --> 00:00:08,429
Laboratory in Pasadena California I'm

3
00:00:13,129 --> 00:00:10,830
Veronica McGregor well the rover has

4
00:00:15,369 --> 00:00:13,139
just completed its all three day three

5
00:00:18,200 --> 00:00:15,379
activities and it has sent us back

6
00:00:20,960 --> 00:00:18,210
postcards of another picture-perfect day

7
00:00:23,120 --> 00:00:20,970
on Mars here to tell us about all of

8
00:00:26,420 --> 00:00:23,130
that in an update on all the activities

9
00:00:27,800 --> 00:00:26,430
we have michael watkins he's the MSL

10
00:00:32,389 --> 00:00:27,810
mission manager from the Jet Propulsion

11
00:00:34,370 --> 00:00:32,399
Laboratory Michael male in the principal

12
00:00:37,040 --> 00:00:34,380
investigator for the mast camera on

13
00:00:41,600 --> 00:00:37,050

curiosity from meal and space science

14
00:00:43,549 --> 00:00:41,610
systems in San Diego Don Summoner a

15
00:00:50,110 --> 00:00:43,559
science team member from the University

16
00:00:52,400 --> 00:00:50,120
of California and Davis and the mishkan

17
00:01:01,119 --> 00:00:52,410
integrated planning and execution team

18
00:01:04,520 --> 00:01:01,129
chief from JPL and Doug Ellison

19
00:01:07,609 --> 00:01:04,530
visualization producer at JPL and we'll

20
00:01:10,130 --> 00:01:07,619
begin with michael watkins ok good

21
00:01:12,859 --> 00:01:10,140
morning we had another really fantastic

22
00:01:17,200 --> 00:01:12,869
day on Mars curiosity and continues to

23
00:01:19,660 --> 00:01:17,210
behave basically flawlessly and and

24
00:01:22,460 --> 00:01:19,670
executed all all the planned activities

25
00:01:23,719 --> 00:01:22,470
successfully nominally yesterday and

26
00:01:25,880 --> 00:01:23,729
it's a good time for me to point out

27
00:01:27,770 --> 00:01:25,890
that the the team operating curiosity

28
00:01:30,499 --> 00:01:27,780
also is performing basically flawlessly

29
00:01:33,859 --> 00:01:30,509
and completing all planned activities as

30
00:01:36,050 --> 00:01:33,869
well it's really really just a great day

31
00:01:38,990 --> 00:01:36,060
all around so thus all three activities

32
00:01:40,999 --> 00:01:39,000
consist of a couple of things we you

33
00:01:43,270 --> 00:01:41,009
know we're about to do a we're about to

34
00:01:46,429 --> 00:01:43,280
upgrade our our software on the rover

35
00:01:47,480 --> 00:01:46,439
just like we upgrade our operating

36
00:01:49,039 --> 00:01:47,490
system on your home computer and your

37
00:01:50,210 --> 00:01:49,049
laptop or something we're going to do

38
00:01:52,670 --> 00:01:50,220

the same thing we need a new flight

39
00:01:54,380 --> 00:01:52,680
software load that is optimized for

40
00:01:55,850 --> 00:01:54,390
surface so we landed on one that was

41
00:01:57,200 --> 00:01:55,860
optimized for landing but you know

42
00:01:59,090 --> 00:01:57,210
landing doesn't have to drive the rover

43
00:02:00,620 --> 00:01:59,100
and operate the arm and all that and by

44
00:02:02,030 --> 00:02:00,630
the same token the surface doesn't have

45
00:02:03,410 --> 00:02:02,040
to doesn't have to land the vehicle so

46
00:02:05,300 --> 00:02:03,420
we want to switch to this new flight

47
00:02:07,730 --> 00:02:05,310
software that's that's really optimized

48
00:02:08,979 --> 00:02:07,740
for for for surface operations and we're

49
00:02:11,640 --> 00:02:08,989
going to do that starting tomorrow

50
00:02:13,830 --> 00:02:11,650
actually day after tomorrow sorry

51
00:02:15,449 --> 00:02:13,840
solve 5 is we're going to start that

52
00:02:17,069 --> 00:02:15,459
activity so we had a little prep work

53
00:02:19,500 --> 00:02:17,079
for that activity we want to check out

54
00:02:20,789 --> 00:02:19,510
the our backup flight computer and make

55
00:02:23,220 --> 00:02:20,799
sure that that was healthy and it looks

56
00:02:24,569 --> 00:02:23,230
fine we also send up some files to get

57
00:02:26,699 --> 00:02:24,579
ready for the for the for the flight

58
00:02:28,050 --> 00:02:26,709
software transition now the other things

59
00:02:29,640 --> 00:02:28,060
we did was check out some more of our

60
00:02:30,990 --> 00:02:29,650
instruments to do some more health

61
00:02:33,479 --> 00:02:31,000
checks on them on the remaining

62
00:02:37,199 --> 00:02:33,489
instruments and so we checked out the

63
00:02:38,970 --> 00:02:37,209

Sam instrument chemin apxs and Dan and

64
00:02:40,289 --> 00:02:38,980
they all they all pass those checks

65
00:02:42,330 --> 00:02:40,299
successfully they're all in great shape

66
00:02:44,399 --> 00:02:42,340
as far as we know you know through the

67
00:02:46,039 --> 00:02:44,409
tests that we've done and and that's a

68
00:02:48,509 --> 00:02:46,049
that's a great sign and you know nothing

69
00:02:53,670 --> 00:02:48,519
nothing no anomaly showed up at all in

70
00:02:57,210 --> 00:02:53,680
that in any of those tests we we also

71
00:03:00,569 --> 00:02:57,220
took a whole lot of imagery around us so

72
00:03:02,819 --> 00:03:00,579
we took a 360-degree panorama of using

73
00:03:04,349 --> 00:03:02,829
the nav cams of the train around the

74
00:03:06,149 --> 00:03:04,359
rover and also you look back at

75
00:03:08,099 --> 00:03:06,159
ourselves and took a close-up of the of

76
00:03:10,170 --> 00:03:08,109
the deck we also took the first strand

77
00:03:11,190 --> 00:03:10,180
60 degree panorama in color that Mike

78
00:03:13,020 --> 00:03:11,200
male and we'll talk about a little bit

79
00:03:16,020 --> 00:03:13,030
and started to get the first first bits

80
00:03:21,809 --> 00:03:16,030
of that down so let me let me start by

81
00:03:27,479 --> 00:03:21,819
showing the sum of those images make

82
00:03:29,909 --> 00:03:27,489
sure okay so this is our this is our

83
00:03:32,580 --> 00:03:29,919
deck pan and now we're kind of zooming

84
00:03:35,039 --> 00:03:32,590
in here and you can see here that that's

85
00:03:37,860 --> 00:03:35,049
actually the rad instrument and you can

86
00:03:39,960 --> 00:03:37,870
see a few of these kind of large large

87
00:03:41,789 --> 00:03:39,970
for us pebbles on the surface and those

88
00:03:43,680 --> 00:03:41,799

are apparently were kicked up by the by

89
00:03:45,899 --> 00:03:43,690
the landing event apparently our Mars

90
00:03:48,930 --> 00:03:45,909
Lander engines actually pushed up some

91
00:03:51,390 --> 00:03:48,940
of these gravel kind of stuff maybe up

92
00:03:55,170 --> 00:03:51,400
to about a centimeter in size on top the

93
00:03:59,009 --> 00:03:55,180
rover and they pose no no problem for

94
00:04:00,659 --> 00:03:59,019
operations they we do move the black

95
00:04:03,330 --> 00:04:00,669
thing there the the differential pivot

96
00:04:05,759 --> 00:04:03,340
around but but can easily go over these

97
00:04:07,559 --> 00:04:05,769
or crush these or not even not even hit

98
00:04:09,180 --> 00:04:07,569
them at all go on top of them so we

99
00:04:10,289 --> 00:04:09,190
don't see any operational constraint by

100
00:04:13,319 --> 00:04:10,299
this stuff being there but it's a little

101
00:04:15,659 --> 00:04:13,329
unexpected that that it is there the the

102
00:04:17,520 --> 00:04:15,669
edl team when they analyzed the landing

103
00:04:19,080 --> 00:04:17,530
before landing I think they didn't think

104
00:04:21,779 --> 00:04:19,090
they would kick up stuff this this large

105
00:04:22,720 --> 00:04:21,789
and so I think they're off looking at

106
00:04:24,580 --> 00:04:22,730
that

107
00:04:27,130 --> 00:04:24,590
maybe these are lighter material than

108
00:04:28,300 --> 00:04:27,140
they expected or something like that but

109
00:04:30,010 --> 00:04:28,310
you're the EO guys you know they have

110
00:04:32,350 --> 00:04:30,020
nothing to do now so so that you know

111
00:04:33,700 --> 00:04:32,360
they know they know they need a problem

112
00:04:35,220 --> 00:04:33,710
to go start working on right so this is

113
00:04:37,150 --> 00:04:35,230

this is this is something for them to do

114
00:04:38,470 --> 00:04:37,160
but as I mentioned we don't see any

115
00:04:39,670 --> 00:04:38,480
impact to this you know the rad

116
00:04:40,810 --> 00:04:39,680
instrument and our other instruments

117
00:04:42,190 --> 00:04:40,820
don't seem to be there not covered by

118
00:04:44,770 --> 00:04:42,200
any it's not it's not affecting the

119
00:04:46,720 --> 00:04:44,780
science observations so so you know we

120
00:04:49,960 --> 00:04:46,730
think that all that's in pretty good

121
00:04:52,300 --> 00:04:49,970
shape let's go to the next slide okay

122
00:04:53,590 --> 00:04:52,310
this is just a kind of a context shot

123
00:04:55,720 --> 00:04:53,600
here here we are they can see the

124
00:04:58,450 --> 00:04:55,730
high-gain antenna there to the that's

125
00:04:59,530 --> 00:04:58,460
the hexagonal thing pointed off to the

126
00:05:01,810 --> 00:04:59,540
side there and then behind it that

127
00:05:04,750 --> 00:05:01,820
little thing sticking up is the low gain

128
00:05:06,960 --> 00:05:04,760
antenna and you can see the rim of the

129
00:05:10,930 --> 00:05:06,970
crater off off in the distance there and

130
00:05:13,030 --> 00:05:10,940
we also we also acquired some color pans

131
00:05:16,260 --> 00:05:13,040
of this area and mike meal and we'll

132
00:05:19,780 --> 00:05:16,270
we'll talk about those thank you Mike

133
00:05:21,760 --> 00:05:19,790
Here I am again wearing another

134
00:05:24,280 --> 00:05:21,770
different hat this time on the principal

135
00:05:26,980 --> 00:05:24,290
investigator of the mast camera and

136
00:05:32,200 --> 00:05:26,990
before you've seen me here is Marty the

137
00:05:34,870 --> 00:05:32,210
scent imaging and we got a 360 degree

138
00:05:37,450 --> 00:05:34,880

panorama into the sequence from

139
00:05:40,060 --> 00:05:37,460
yesterday and we got our thumbnails back

140
00:05:43,270 --> 00:05:40,070
and I'll need to tell you that the the

141
00:05:45,070 --> 00:05:43,280
full frames are now stored inside the

142
00:05:48,460 --> 00:05:45,080
camera and we do have to get those

143
00:05:52,360 --> 00:05:48,470
images out of the camera and stored into

144
00:05:55,660 --> 00:05:52,370
the the rover's memory in order to bring

145
00:05:58,390 --> 00:05:55,670
them back home but today this saw we're

146
00:06:01,150 --> 00:05:58,400
planning now for is the last saw we have

147
00:06:04,840 --> 00:06:01,160
until after the software activity goes

148
00:06:07,150 --> 00:06:04,850
oh goes through to to get them queued up

149
00:06:09,520 --> 00:06:07,160
so we're going to cue up a few of the

150
00:06:10,990 --> 00:06:09,530
full resolution images again what I'm

151
00:06:14,020 --> 00:06:11,000
showing your thumbnails you should

152
00:06:17,050 --> 00:06:14,030
remember back a couple of Sol's ago when

153
00:06:19,570 --> 00:06:17,060
I showed you the thumbnail of the the

154
00:06:21,820 --> 00:06:19,580
heat shield and then I faded that into

155
00:06:23,470 --> 00:06:21,830
the full resolution that's the kind of

156
00:06:25,090 --> 00:06:23,480
difference you will you should expect to

157
00:06:27,100 --> 00:06:25,100
see between what I'm going to show you

158
00:06:29,140 --> 00:06:27,110
now and what will i'll show you when we

159
00:06:31,360 --> 00:06:29,150
get some of the full resolution frames

160
00:06:36,180 --> 00:06:31,370
back so I've kind of have the animation

161
00:06:38,160 --> 00:06:36,190
please a video this is the full 360

162
00:06:40,920 --> 00:06:38,170
Rama it's the color as it was

163
00:06:43,140 --> 00:06:40,930

transmitted accepted brightened up it

164
00:06:45,060 --> 00:06:43,150
was pretty dark to begin with you see

165
00:06:47,760 --> 00:06:45,070
there in that area going off to the

166
00:06:50,730 --> 00:06:47,770
right now the impact of the the plume

167
00:06:53,310 --> 00:06:50,740
impact site of the rocket plumes we're

168
00:06:56,060 --> 00:06:53,320
now panning across the base of Mount

169
00:06:59,850 --> 00:06:56,070
sharp we see the shadow of some of the

170
00:07:03,000 --> 00:06:59,860
hardware on the rover itself we zoom in

171
00:07:04,830 --> 00:07:03,010
because there's a big gap of places we

172
00:07:07,470 --> 00:07:04,840
did take pictures so this gives you a

173
00:07:09,360 --> 00:07:07,480
better view of the the tier of images

174
00:07:11,370 --> 00:07:09,370
that we did get you'll pick up the rim

175
00:07:13,920 --> 00:07:11,380
up at the very top and the haze haze

176
00:07:15,660 --> 00:07:13,930
shows up pretty well in the in the color

177
00:07:17,340 --> 00:07:15,670
you can see it's slightly different

178
00:07:19,680 --> 00:07:17,350
color you can see it's a low light layer

179
00:07:20,880 --> 00:07:19,690
there as was seen in an Afghan and then

180
00:07:22,890 --> 00:07:20,890
we're going to zoom in here again to

181
00:07:25,380 --> 00:07:22,900
look at the this is the area that's been

182
00:07:28,970 --> 00:07:25,390
discussed it was showing last time I was

183
00:07:32,780 --> 00:07:28,980
here grotzinger talked about bedrock and

184
00:07:35,760 --> 00:07:32,790
digging up material by the rocket plumes

185
00:07:37,500 --> 00:07:35,770
so if we can keep going now I think

186
00:07:40,830 --> 00:07:37,510
we're going to back out from this and

187
00:07:43,650 --> 00:07:40,840
just show you the full mosaic again and

188
00:07:44,880 --> 00:07:43,660

zoom in back to the other plumes and

189
00:07:46,440 --> 00:07:44,890
then we're going to zoom it back into

190
00:07:49,020 --> 00:07:46,450
the proof so you can see the plumes are

191
00:07:51,240 --> 00:07:49,030
light toned that's that could be a

192
00:07:52,740 --> 00:07:51,250
contaminant we don't know we probably

193
00:07:54,870 --> 00:07:52,750
won't know unless we go over and observe

194
00:07:58,920 --> 00:07:54,880
these things other than that this is a

195
00:08:03,210 --> 00:07:58,930
very low resolution image there the

196
00:08:05,700 --> 00:08:03,220
images are only 144 by 144 pixels there

197
00:08:09,750 --> 00:08:05,710
130 of them in here took us about an

198
00:08:11,280 --> 00:08:09,760
hour six minutes to take the mosaic and

199
00:08:12,710 --> 00:08:11,290
with that I'll hand it off to someone's

200
00:08:15,659 --> 00:08:12,720
going to interpret some of this stuff

201
00:08:18,659 --> 00:08:15,669
yeah so we have these beautiful images

202
00:08:20,130 --> 00:08:18,669
and Mike did a nice job describing some

203
00:08:22,440 --> 00:08:20,140
of the interesting features we can see

204
00:08:25,220 --> 00:08:22,450
at the in the early part we're really

205
00:08:29,970 --> 00:08:25,230
looking forward to the full resolution

206
00:08:33,899 --> 00:08:29,980
images we can also see the main reason

207
00:08:37,770 --> 00:08:33,909
we chose Gale as a landing site so if I

208
00:08:40,860 --> 00:08:37,780
could have the first slide so we have

209
00:08:43,200 --> 00:08:40,870
this is the navcomm mosaic and in the

210
00:08:46,079 --> 00:08:43,210
upper right you can actually see the

211
00:08:47,020 --> 00:08:46,089
main target area of where we want to go

212
00:08:49,540 --> 00:08:47,030
and

213
00:08:52,810 --> 00:08:49,550

chosen so in the hills at the back

214
00:08:55,270 --> 00:08:52,820
rounded about well between 190 and 200

215
00:08:57,970 --> 00:08:55,280
at the degrees at the top you see these

216
00:09:02,010 --> 00:08:57,980
beautiful knowles and of layered rocks

217
00:09:04,630 --> 00:09:02,020
and the and that is the those layers are

218
00:09:07,450 --> 00:09:04,640
what's recording the history and Gale

219
00:09:09,460 --> 00:09:07,460
Crater and they are one of the reasons

220
00:09:11,980 --> 00:09:09,470
we chose Gale Crater the main the main

221
00:09:15,280 --> 00:09:11,990
reason is to study those rocks so we can

222
00:09:19,210 --> 00:09:15,290
see those in the distance from where we

223
00:09:24,520 --> 00:09:19,220
are and it's very exciting to think

224
00:09:29,290 --> 00:09:24,530
about getting there but it is a quite a

225
00:09:31,570 --> 00:09:29,300
ways away and we also want to be able to

226
00:09:34,870 --> 00:09:31,580
take the science that we can do where we

227
00:09:38,920 --> 00:09:34,880
landed and integrate that into the

228
00:09:42,160 --> 00:09:38,930
mission as well so next slide I've been

229
00:09:44,350 --> 00:09:42,170
coordinating a some others a mapping

230
00:09:46,660 --> 00:09:44,360
effort and so you can see in this image

231
00:09:50,410 --> 00:09:46,670
you can see the landing ellipse outlined

232
00:09:54,520 --> 00:09:50,420
in red and we've divided the area up

233
00:09:56,890 --> 00:09:54,530
into about one mile by one mile quads or

234
00:09:59,680 --> 00:09:56,900
squares and we had volunteers from the

235
00:10:01,840 --> 00:09:59,690
science team map each quad and what

236
00:10:03,580 --> 00:10:01,850
mapping means is is looking at the

237
00:10:07,330 --> 00:10:03,590
different textures that you can see in

238
00:10:10,690 --> 00:10:07,340

the images and mapping the boundaries

239
00:10:13,120 --> 00:10:10,700
between those textures so if we do that

240
00:10:16,030 --> 00:10:13,130
for geology on earth to mark where

241
00:10:20,980 --> 00:10:16,040
different types of rocks are outlined

242
00:10:22,890 --> 00:10:20,990
and curiosity landed in Quad 51 which

243
00:10:27,010 --> 00:10:22,900
happens to be one of the ones I mapped

244
00:10:30,550 --> 00:10:27,020
so I'm sure that that was intentional by

245
00:10:32,170 --> 00:10:30,560
the navigation team and so what the

246
00:10:33,850 --> 00:10:32,180
science team is now doing is we have

247
00:10:35,530 --> 00:10:33,860
these individual maps and we started

248
00:10:40,000 --> 00:10:35,540
integrating them to get the broader

249
00:10:42,940 --> 00:10:40,010
picture and also investigating the rocks

250
00:10:46,870 --> 00:10:42,950
and sort of in craters and patterns

251
00:10:51,610 --> 00:10:46,880
around where curiosity is now and we'll

252
00:10:54,820 --> 00:10:51,620
use this map to find a path from where

253
00:10:57,840 --> 00:10:54,830
we landed to the main target at the base

254
00:11:00,600 --> 00:10:57,850
of Mount sharp which is

255
00:11:03,780 --> 00:11:00,610
south of where we landed and so we'll

256
00:11:05,670 --> 00:11:03,790
drive on the northwest side of the dunes

257
00:11:07,800 --> 00:11:05,680
and go through a break in the dune field

258
00:11:10,199 --> 00:11:07,810
but on the way we're going to have a lot

259
00:11:13,470 --> 00:11:10,209
of interesting geology to look at and so

260
00:11:16,139 --> 00:11:13,480
the team will be balancing observations

261
00:11:20,999 --> 00:11:16,149
and scientific investigations on our

262
00:11:22,769 --> 00:11:21,009
drive but also still get to the base of

263
00:11:26,160 --> 00:11:22,779

Mount sharp if I could have in the next

264
00:11:29,129 --> 00:11:26,170
slide this is the quad 51 where

265
00:11:30,689 --> 00:11:29,139
curiosity landed and you can you can

266
00:11:33,480 --> 00:11:30,699
tell by looking at this image that we

267
00:11:38,069 --> 00:11:33,490
have several different textures of rocks

268
00:11:41,490 --> 00:11:38,079
and surfaces in this and the team is is

269
00:11:43,620 --> 00:11:41,500
focused on what are the key observations

270
00:11:46,410 --> 00:11:43,630
we can make here that will tell us about

271
00:11:51,540 --> 00:11:46,420
our landing site and then we will go

272
00:11:54,540 --> 00:11:51,550
from those and choose a path to the base

273
00:11:56,519 --> 00:11:54,550
of Mount sharp doing the best sciences

274
00:12:00,749 --> 00:11:56,529
that we can along the way but also

275
00:12:05,569 --> 00:12:00,759
keeping our eyes on that beautiful

276
00:12:09,900 --> 00:12:07,499
okay well you're hearing about these

277
00:12:13,170 --> 00:12:09,910
great results and images coming back and

278
00:12:14,610 --> 00:12:13,180
what they mean I'm here not to talk

279
00:12:17,280 --> 00:12:14,620
about those but talk about what we're

280
00:12:19,110 --> 00:12:17,290
doing all day in our mission operations

281
00:12:22,259 --> 00:12:19,120
in order to enable getting those results

282
00:12:24,240 --> 00:12:22,269
back and and my team is the team that

283
00:12:26,249 --> 00:12:24,250
does the the command sequencing and

284
00:12:30,059 --> 00:12:26,259
integrates things coming from from the

285
00:12:32,269 --> 00:12:30,069
science teams and it's a challenging

286
00:12:34,769 --> 00:12:32,279
issue to actually do the operations

287
00:12:37,110 --> 00:12:34,779
because we can't joystick the rover due

288
00:12:39,720 --> 00:12:37,120

to the time delay and a number of other

289
00:12:42,420 --> 00:12:39,730
reasons we have a very highly resource

290
00:12:45,559 --> 00:12:42,430
constrained vehicle the amount of power

291
00:12:48,329 --> 00:12:45,569
that we're getting from the RTG is

292
00:12:50,490 --> 00:12:48,339
basically a little bit more than you

293
00:12:52,079 --> 00:12:50,500
need to power a hundred watt light bulb

294
00:12:55,590 --> 00:12:52,089
we might have in your hallway at home

295
00:12:58,650 --> 00:12:55,600
and we need to also deal with the data

296
00:13:01,949 --> 00:12:58,660
volume and basically make sure that we

297
00:13:04,860 --> 00:13:01,959
can fit the data that we get into our

298
00:13:09,120 --> 00:13:04,870
next available opportunity to get to get

299
00:13:11,580 --> 00:13:09,130
data down through our orbiter relays in

300
00:13:14,520 --> 00:13:11,590
addition we have to make sure that the

301
00:13:16,470 --> 00:13:14,530
that we can actually achieve what we

302
00:13:17,940 --> 00:13:16,480
want within the time that's available to

303
00:13:21,120 --> 00:13:17,950
the rover because it can only do things

304
00:13:23,640 --> 00:13:21,130
so quickly and and get that done in time

305
00:13:25,800 --> 00:13:23,650
for that down Lee we can only

306
00:13:28,460 --> 00:13:25,810
communicate with the you know with the

307
00:13:32,610 --> 00:13:28,470
rover's a few times per Martian day and

308
00:13:34,260 --> 00:13:32,620
we have to fit those things in so in

309
00:13:36,120 --> 00:13:34,270
addition we also have to deal with all

310
00:13:38,340 --> 00:13:36,130
the complex of trying to manage all of

311
00:13:40,080 --> 00:13:38,350
the different types of activities that

312
00:13:42,690 --> 00:13:40,090
the members of the science team and

313
00:13:45,390 --> 00:13:42,700

engineering teams want to do so that for

314
00:13:47,520 --> 00:13:45,400
example we don't try to point the mask

315
00:13:48,900 --> 00:13:47,530
for to take mass cam images in one

316
00:13:51,600 --> 00:13:48,910
direction at the same time that we want

317
00:13:54,030 --> 00:13:51,610
to be pointing to take take engineering

318
00:13:56,280 --> 00:13:54,040
camera images so there's hundreds of

319
00:13:58,620 --> 00:13:56,290
those rules that we need to to manage

320
00:14:01,260 --> 00:13:58,630
and all of that takes time and our

321
00:14:03,600 --> 00:14:01,270
solution to dealing with the challenges

322
00:14:06,660 --> 00:14:03,610
is effectively we're writing a software

323
00:14:09,420 --> 00:14:06,670
program every day that has to run the

324
00:14:10,800 --> 00:14:09,430
first time when we send it up to the to

325
00:14:13,200 --> 00:14:10,810
the vehicle that's going to operate on

326
00:14:16,860 --> 00:14:13,210
to tell tell her over what it's going to

327
00:14:19,410 --> 00:14:16,870
do over the next day and that really

328
00:14:21,990 --> 00:14:19,420
involves a combined team of engineers

329
00:14:25,080 --> 00:14:22,000
and scientists who are working together

330
00:14:28,140 --> 00:14:25,090
over the course of 16 hours basically

331
00:14:31,800 --> 00:14:28,150
every every Martian Saul and if I can

332
00:14:36,780 --> 00:14:31,810
get the graphic this is just a brief

333
00:14:38,520 --> 00:14:36,790
summary of our process and one key point

334
00:14:40,140 --> 00:14:38,530
it is you'll see that all of this that's

335
00:14:43,170 --> 00:14:40,150
going on is pretty much when the rover

336
00:14:44,730 --> 00:14:43,180
is asleep and and so that's why I call

337
00:14:46,890 --> 00:14:44,740
it the overnight timeline from the

338
00:14:49,530 --> 00:14:46,900

standpoint of the rover we're doing all

339
00:14:51,360 --> 00:14:49,540
of our work when when it's not really

340
00:14:53,250 --> 00:14:51,370
doing much activity except for maybe

341
00:14:55,230 --> 00:14:53,260
some you know brief wake ups for

342
00:14:59,190 --> 00:14:55,240
nighttime operations or communications

343
00:15:01,230 --> 00:14:59,200
and in this process we've got starting

344
00:15:03,690 --> 00:15:01,240
point in the timeline where we get one

345
00:15:07,200 --> 00:15:03,700
or another orbiter pass coming bringing

346
00:15:10,230 --> 00:15:07,210
down data from the basically the rover's

347
00:15:13,830 --> 00:15:10,240
late afternoon and getting that on the

348
00:15:16,440 --> 00:15:13,840
ground which has some data volume that's

349
00:15:18,720 --> 00:15:16,450
going to vary from Saul to Saul we

350
00:15:20,820 --> 00:15:18,730
produce the products that we need to in

351
00:15:22,530 --> 00:15:20,830
order to be able to see the images after

352
00:15:23,980 --> 00:15:22,540
them constructed and and the other

353
00:15:26,380 --> 00:15:23,990
telemetry

354
00:15:28,180 --> 00:15:26,390
and then we in our engineering teams and

355
00:15:30,280 --> 00:15:28,190
science teams are assessing and making

356
00:15:32,949 --> 00:15:30,290
sure that the rover is healthy over the

357
00:15:35,320 --> 00:15:32,959
course of a few hours and and looking at

358
00:15:37,420 --> 00:15:35,330
the results so that we can based on that

359
00:15:39,250 --> 00:15:37,430
decide we want what we want to do and

360
00:15:43,570 --> 00:15:39,260
what the next steps are for thus all

361
00:15:45,910 --> 00:15:43,580
that will follow at that point we end up

362
00:15:47,740 --> 00:15:45,920
in a meeting and where we end up

363
00:15:49,600 --> 00:15:47,750

addressing those those items and

364
00:15:53,650 --> 00:15:49,610
bringing the the key issues to the fore

365
00:15:55,540 --> 00:15:53,660
and that involves about 20 folks at that

366
00:15:57,639 --> 00:15:55,550
point in parallel with all of that

367
00:16:00,550 --> 00:15:57,649
science teams and engineering teams are

368
00:16:02,650 --> 00:16:00,560
looking at the activities that that need

369
00:16:06,280 --> 00:16:02,660
to be constructed into a coherent plan

370
00:16:08,139 --> 00:16:06,290
for the next Saul when that is put

371
00:16:09,880 --> 00:16:08,149
together and D conflicted and we made

372
00:16:13,000 --> 00:16:09,890
sure that we aren't violating any of the

373
00:16:15,100 --> 00:16:13,010
hundreds of constraints we will review

374
00:16:17,440 --> 00:16:15,110
that per group of scientists and

375
00:16:19,210 --> 00:16:17,450
engineers it may be about 40 people and

376
00:16:20,980 --> 00:16:19,220
we're kind of ruthlessly sticking to

377
00:16:23,590 --> 00:16:20,990
this timeline because all this is

378
00:16:26,889 --> 00:16:23,600
leading us to our command opportunity

379
00:16:30,069 --> 00:16:26,899
after having that plan we then turn

380
00:16:34,240 --> 00:16:30,079
those into command sequences which is

381
00:16:36,069 --> 00:16:34,250
effectively this software of up to maybe

382
00:16:37,870 --> 00:16:36,079
a thousand commands that are going to be

383
00:16:39,880 --> 00:16:37,880
executed to govern exactly what the

384
00:16:42,160 --> 00:16:39,890
rover's going to do over the next

385
00:16:44,199 --> 00:16:42,170
Martian day when we prove it to

386
00:16:45,790 --> 00:16:44,209
ourselves we haven't created any issues

387
00:16:49,960 --> 00:16:45,800
and that everything will will execute

388
00:16:51,639 --> 00:16:49,970

properly then we approve that and uplink

389
00:16:53,769 --> 00:16:51,649
it and you can see in the graphic the

390
00:16:56,050 --> 00:16:53,779
deadline of what we have to hit that

391
00:16:58,150 --> 00:16:56,060
deadline when we have our communications

392
00:16:59,920 --> 00:16:58,160
opportunity because that's our one time

393
00:17:03,310 --> 00:16:59,930
to really tell the rover what we want it

394
00:17:06,490 --> 00:17:03,320
to do and and get that up there and then

395
00:17:08,740 --> 00:17:06,500
it operates on its own until it can

396
00:17:11,049 --> 00:17:08,750
communicate back in the afternoon the

397
00:17:14,980 --> 00:17:11,059
results of what's happened and so that's

398
00:17:18,280 --> 00:17:14,990
the basic cycle that keeps really over a

399
00:17:20,309 --> 00:17:18,290
hundred hundred people busy over that 16

400
00:17:23,230 --> 00:17:20,319
our timeline and really running a sprint

401
00:17:26,309 --> 00:17:23,240
every day to make sure that that we can

402
00:17:29,890 --> 00:17:26,319
be meet that mark and keep the vehicle

403
00:17:31,450 --> 00:17:29,900
productive and gathering science or

404
00:17:34,630 --> 00:17:31,460
doing a flights our flight software

405
00:17:36,890 --> 00:17:34,640
transition so I'll turn it over to Doug

406
00:17:38,720 --> 00:17:36,900
thanks Andy um

407
00:17:40,670 --> 00:17:38,730
exactly a week ago I was SAT here and

408
00:17:42,650 --> 00:17:40,680
was introducing you all to a tool called

409
00:17:44,600 --> 00:17:42,660
eyes on the solar system which lets you

410
00:17:45,920 --> 00:17:44,610
write on board with many the spacecraft

411
00:17:47,720 --> 00:17:45,930
that are exploring the solar system and

412
00:17:49,940 --> 00:17:47,730
in particular the the module

413
00:17:52,580 --> 00:17:49,950

specifically made for curiosity's entry

414
00:17:54,290 --> 00:17:52,590
descent and landing and I didn't want to

415
00:17:55,550 --> 00:17:54,300
spoil surprised at that time I didn't

416
00:17:56,720 --> 00:17:55,560
show you all the way to landing I didn't

417
00:17:59,840 --> 00:17:56,730
want to spoil things for you but that

418
00:18:00,830 --> 00:17:59,850
surprised it worked and I would come

419
00:18:03,290 --> 00:18:00,840
back just to kind of give you an update

420
00:18:05,210 --> 00:18:03,300
on on how that went how accurate we were

421
00:18:06,710 --> 00:18:05,220
how many people were watching and other

422
00:18:08,560 --> 00:18:06,720
things you can still do in eyes on the

423
00:18:11,990 --> 00:18:08,570
solar system now we're on the ground

424
00:18:15,370 --> 00:18:12,000
yesterday Jennifer reported to you are a

425
00:18:19,060 --> 00:18:15,380
touchdown time of on spacecraft time

426
00:18:22,640 --> 00:18:19,070
1017 and fifty seven point three seconds

427
00:18:24,320 --> 00:18:22,650
the navigation team led by Fernando they

428
00:18:27,230 --> 00:18:24,330
gave us such rejection three weeks ahead

429
00:18:31,430 --> 00:18:27,240
of touchdown and our touchdown time was

430
00:18:33,380 --> 00:18:31,440
ten 1750 7.9 seconds we have six tenths

431
00:18:35,900 --> 00:18:33,390
of a second out in eyes on the solar

432
00:18:37,310 --> 00:18:35,910
system we're very pleased with that most

433
00:18:38,690 --> 00:18:37,320
people were probably having more an

434
00:18:40,580 --> 00:18:38,700
accuracy based on the clock on their own

435
00:18:43,160 --> 00:18:40,590
computer rather than their than the

436
00:18:44,930 --> 00:18:43,170
trajectory we had in there I also know

437
00:18:46,400 --> 00:18:44,940
thanks Steve Collins one of the the

438
00:18:49,100 --> 00:18:46,410

attitude control engineers who was in

439
00:18:50,830 --> 00:18:49,110
the dark room during landing nighter we

440
00:18:53,450 --> 00:18:50,840
were on console in the afternoon and

441
00:18:54,860 --> 00:18:53,460
steve was furiously gesticulating to us

442
00:18:56,090 --> 00:18:54,870
through the window to tell us that the

443
00:18:58,040 --> 00:18:56,100
other slight tweak for us for the

444
00:19:00,110 --> 00:18:58,050
pointing of the spacecraft and there we

445
00:19:01,730 --> 00:19:00,120
got that in before the big traffic

446
00:19:03,820 --> 00:19:01,740
arrived on eyes on the solar system at

447
00:19:07,610 --> 00:19:03,830
about nine o'clock in the evening

448
00:19:11,480 --> 00:19:07,620
between Saturday and Monday we had 973

449
00:19:13,190 --> 00:19:11,490
thousands landing lights alone we had

450
00:19:15,350 --> 00:19:13,200
seven hundred and thirty-nine thousand

451
00:19:17,450 --> 00:19:15,360
visits our servers pushed about 20

452
00:19:19,310 --> 00:19:17,460
terabytes of data over the weekend to

453
00:19:21,230 --> 00:19:19,320
give people this amazing experience of

454
00:19:23,660 --> 00:19:21,240
writing on board with the spacecraft and

455
00:19:25,820 --> 00:19:23,670
it wasn't just those people at home some

456
00:19:28,670 --> 00:19:25,830
of those visits actually kind of doubled

457
00:19:30,290 --> 00:19:28,680
for words we had there was an event at

458
00:19:32,000 --> 00:19:30,300
the Deep Space Network down in Canberra

459
00:19:33,530 --> 00:19:32,010
led by Glenn Nagel they were using eyes

460
00:19:35,540 --> 00:19:33,540
on the solar system hundreds of people

461
00:19:37,100 --> 00:19:35,550
who are watching there Phil Plait the

462
00:19:40,040 --> 00:19:37,110
bad astronomer he was actually streaming

463
00:19:42,230 --> 00:19:40,050

it live into into a google hangout the

464
00:19:44,930 --> 00:19:42,240
Oregon Museum of Science and Arts Museum

465
00:19:46,580 --> 00:19:44,940
of the organism of science and industry

466
00:19:48,710 --> 00:19:46,590
the museum of arts and sciences in

467
00:19:49,500 --> 00:19:48,720
Georgia and of course planet fest just

468
00:19:51,000 --> 00:19:49,510
down the road here

469
00:19:53,070 --> 00:19:51,010
Selena were all using eyes on the solar

470
00:19:55,170 --> 00:19:53,080
system to let people see what was

471
00:19:57,060 --> 00:19:55,180
happening through the evening in total

472
00:19:59,310 --> 00:19:57,070
we've had reports about 65 different

473
00:20:01,260 --> 00:19:59,320
landing events which were using eyes and

474
00:20:02,520 --> 00:20:01,270
we've had kind of the statistics on

475
00:20:05,700 --> 00:20:02,530
about half of those which adds up to

476
00:20:06,840 --> 00:20:05,710
almost 8,000 extra visitors as well and

477
00:20:08,430 --> 00:20:06,850
we are going to be replacing the

478
00:20:10,290 --> 00:20:08,440
trajectory that was this massive nor

479
00:20:11,610 --> 00:20:10,300
point six seconds off with a

480
00:20:13,200 --> 00:20:11,620
reconstruction at some point in the

481
00:20:14,610 --> 00:20:13,210
future once the edl team of her chance

482
00:20:15,930 --> 00:20:14,620
to digest all of this data they'll be

483
00:20:17,250 --> 00:20:15,940
getting back from the various

484
00:20:19,170 --> 00:20:17,260
instruments on board the vehicle during

485
00:20:20,550 --> 00:20:19,180
landing look at that we turn into a

486
00:20:21,780 --> 00:20:20,560
reconstructed trajectory that when we

487
00:20:23,340 --> 00:20:21,790
put into eyes and then we'll let you

488
00:20:25,710 --> 00:20:23,350

know when you can actually see the

489
00:20:28,080 --> 00:20:25,720
actual series of events it turns out

490
00:20:30,150 --> 00:20:28,090
we're about one quad away from the

491
00:20:31,680 --> 00:20:30,160
actual landing site we're about it where

492
00:20:33,030 --> 00:20:31,690
I think if we were in there I think

493
00:20:35,130 --> 00:20:33,040
we're in quad 64 I don't know how

494
00:20:37,380 --> 00:20:35,140
interesting that is but but once we get

495
00:20:38,700 --> 00:20:37,390
the new new trajectory once you get the

496
00:20:41,280 --> 00:20:38,710
new trajectory will we'll put that in

497
00:20:43,440 --> 00:20:41,290
but in the meantime there are still

498
00:20:44,670 --> 00:20:43,450
things you can find in eyes there are

499
00:20:46,140 --> 00:20:44,680
still some interesting things and we had

500
00:20:47,850 --> 00:20:46,150
people sending us some of their favorite

501
00:20:50,070 --> 00:20:47,860
things during landing night we can cut

502
00:20:53,700 --> 00:20:50,080
to the live feed one of our favorites

503
00:20:55,260 --> 00:20:53,710
was was this one um it's it's the donut

504
00:20:56,910 --> 00:20:55,270
shop it's people putting the camera

505
00:20:58,950 --> 00:20:56,920
right behind the vehicle just before

506
00:21:02,310 --> 00:20:58,960
cruise stage separation you don't need

507
00:21:04,020 --> 00:21:02,320
two dark them right and we have people

508
00:21:05,220 --> 00:21:04,030
sending us different screenshots of with

509
00:21:07,950 --> 00:21:05,230
kind of things they were doing one guy

510
00:21:09,840 --> 00:21:07,960
had a triple wide desktop machine sat on

511
00:21:11,610 --> 00:21:09,850
his desktop watching all of this landing

512
00:21:12,540 --> 00:21:11,620
inside eyes on the solar system I was

513
00:21:13,680 --> 00:21:12,550

going to skip through a few of the

514
00:21:15,500 --> 00:21:13,690
things that you can that you can still

515
00:21:18,420 --> 00:21:15,510
have a look at Mike was here yesterday

516
00:21:20,220 --> 00:21:18,430
talking to us about the ballast impact

517
00:21:22,350 --> 00:21:20,230
that was spotted by the CTX camera on

518
00:21:24,930 --> 00:21:22,360
mro here is that ballast leaving the

519
00:21:27,540 --> 00:21:24,940
spacecraft in is a trajectory was given

520
00:21:28,860 --> 00:21:27,550
for all six pieces of ballast and in

521
00:21:31,290 --> 00:21:28,870
fact the the pictures at the back of the

522
00:21:32,580 --> 00:21:31,300
room there but the impact site was I

523
00:21:34,980 --> 00:21:32,590
believe some way around this little Mesa

524
00:21:36,030 --> 00:21:34,990
down here and again when we get the

525
00:21:39,870 --> 00:21:36,040
reconstruction we're going to put that

526
00:21:41,640 --> 00:21:39,880
in back here as well touchdown was a

527
00:21:43,890 --> 00:21:41,650
little bit a little bit off by there's

528
00:21:46,140 --> 00:21:43,900
no point six seconds the actual landing

529
00:21:47,670 --> 00:21:46,150
site is not far from here in fact we

530
00:21:50,310 --> 00:21:47,680
zoom out we can actually show you how

531
00:21:51,810 --> 00:21:50,320
how far off we were the real landing

532
00:21:53,910 --> 00:21:51,820
sites just about here so we're not too

533
00:21:56,010 --> 00:21:53,920
far off but we moving this so this

534
00:21:57,750 --> 00:21:56,020
beautiful terrain model to bring it up

535
00:22:00,390 --> 00:21:57,760
to date when we do actually have have

536
00:22:02,280 --> 00:22:00,400
that proper location and of course we

537
00:22:03,060 --> 00:22:02,290
even have the the sky crane fly away

538
00:22:04,710 --> 00:22:03,070

that

539
00:22:06,060 --> 00:22:04,720
just by good fortune happen to be in

540
00:22:09,509 --> 00:22:06,070
roughly the same direction as the real

541
00:22:14,940 --> 00:22:09,519
design stage Flyway if it goes to a

542
00:22:18,090 --> 00:22:14,950
polite safe disposal and there's even

543
00:22:19,320 --> 00:22:18,100
more if we go to Seoul to you notice

544
00:22:20,690 --> 00:22:19,330
we've we've swapped the river around as

545
00:22:22,649 --> 00:22:20,700
two pointed in the right direction and

546
00:22:24,930 --> 00:22:22,659
we're taking now to the moment in time

547
00:22:26,669 --> 00:22:24,940
when the master was actually deployed on

548
00:22:28,470 --> 00:22:26,679
the afternoon of sold to I'm going to

549
00:22:30,629 --> 00:22:28,480
fast forward because it's a stand that

550
00:22:33,600 --> 00:22:30,639
takes about a minute but there is the

551
00:22:35,610 --> 00:22:33,610
stand up and turning around to that to

552
00:22:37,440 --> 00:22:35,620
that son the anti son position and of

553
00:22:40,740 --> 00:22:37,450
course you can see Mike's two beautiful

554
00:22:42,029 --> 00:22:40,750
cameras right in there and this doesn't

555
00:22:43,200 --> 00:22:42,039
live in isolation of course it lives

556
00:22:45,570 --> 00:22:43,210
with all the other spacecraft in our

557
00:22:47,190 --> 00:22:45,580
solar system so if we leave the edl

558
00:22:49,139 --> 00:22:47,200
module you can see the whole of the

559
00:22:51,029 --> 00:22:49,149
solar system others can go back to Mars

560
00:22:52,919 --> 00:22:51,039
and to the present moment of time which

561
00:22:54,810 --> 00:22:52,929
is right now this is where things are

562
00:22:56,850 --> 00:22:54,820
right now you can see curiosity in the

563
00:22:59,310 --> 00:22:56,860

landing site right here in Gale Crater

564
00:23:01,440 --> 00:22:59,320
it's nighttime right there now but we

565
00:23:03,450 --> 00:23:01,450
have odyssey we have mro and so in eyes

566
00:23:05,369 --> 00:23:03,460
I mean Emily something a question a few

567
00:23:07,049 --> 00:23:05,379
days ago is there a table lookup table

568
00:23:08,279 --> 00:23:07,059
of communication passes and I

569
00:23:10,440 --> 00:23:08,289
something's all actually you can find

570
00:23:12,779 --> 00:23:10,450
them right in here if you fast forward

571
00:23:14,159 --> 00:23:12,789
through time you can see as the planet

572
00:23:16,320 --> 00:23:14,169
rotates underneath you see the two

573
00:23:17,669 --> 00:23:16,330
orbiters going overhead and so that

574
00:23:18,990 --> 00:23:17,679
would be a communications past there is

575
00:23:20,879 --> 00:23:19,000
mr guys have head another one for

576
00:23:23,159 --> 00:23:20,889
odyssey right there every two hours or

577
00:23:26,399 --> 00:23:23,169
so these spacecraft sir fly over the

578
00:23:27,960 --> 00:23:26,409
landing site and then when you get the

579
00:23:31,830 --> 00:23:27,970
sunrise of course we can that we can go

580
00:23:34,409 --> 00:23:31,840
into the landing site and there we can

581
00:23:38,909 --> 00:23:34,419
see the sun rise in the east right next

582
00:23:40,470 --> 00:23:38,919
to mount sharp and so all these things

583
00:23:42,990 --> 00:23:40,480
are people things that people can still

584
00:23:44,009 --> 00:23:43,000
do at home and and we'll have news for

585
00:23:45,330 --> 00:23:44,019
you when we get this reconstructed

586
00:23:47,220 --> 00:23:45,340
directory probably in a few weeks time

587
00:23:49,379 --> 00:23:47,230
with that i'll throw it back to Veronica

588
00:23:51,180 --> 00:23:49,389

alright thank you we will start with

589
00:23:53,009 --> 00:23:51,190
questions here at JPL and then we will

590
00:23:54,960 --> 00:23:53,019
go to some questions on the phone line

591
00:23:59,129 --> 00:23:54,970
I'm going to start here in the middle

592
00:24:01,769 --> 00:23:59,139
and then we'll go over to Leo's well to

593
00:24:03,180 --> 00:24:01,779
real quick ones Mike the colors that

594
00:24:05,220 --> 00:24:03,190
you're showing us in these images are

595
00:24:08,639 --> 00:24:05,230
they natural color or white balance

596
00:24:11,190 --> 00:24:08,649
color there you want me to answer them

597
00:24:13,980 --> 00:24:11,200
one of the they are not white balance

598
00:24:15,509 --> 00:24:13,990
there what the camera sent back I just

599
00:24:16,830 --> 00:24:15,519
brightened it up because the

600
00:24:19,110 --> 00:24:16,840
illumination at mar

601
00:24:21,779 --> 00:24:19,120
is much less than at Earth and we were

602
00:24:23,279 --> 00:24:21,789
concerned when we set the exposures to

603
00:24:24,870 --> 00:24:23,289
be able to make sure that there if there

604
00:24:28,740 --> 00:24:24,880
was something glinting that we didn't

605
00:24:31,110 --> 00:24:28,750
saturate the detector so the images were

606
00:24:33,269 --> 00:24:31,120
pretty underexposed for a normal

607
00:24:35,039 --> 00:24:33,279
photographer so I just brighten them up

608
00:24:37,860 --> 00:24:35,049
and that's just what the bear filter

609
00:24:40,740 --> 00:24:37,870
gives you when you look at Mars and and

610
00:24:43,380 --> 00:24:40,750
for Doug since you simulated the flyaway

611
00:24:46,440 --> 00:24:43,390
of the sky crane can you estimate the

612
00:24:49,260 --> 00:24:46,450
angle at which it struck the surface I

613
00:24:50,760 --> 00:24:49,270

can eyeball it I'm sure the edl team

614
00:24:54,149 --> 00:24:50,770
will be on a panel tomorrow they give

615
00:24:55,620 --> 00:24:54,159
you a better answer them it's a I would

616
00:24:57,090 --> 00:24:55,630
something around 45 degrees I'd have

617
00:24:59,070 --> 00:24:57,100
guessed but that is just a kind of an

618
00:25:02,960 --> 00:24:59,080
eyeball gas based on this the edl thing

619
00:25:08,760 --> 00:25:05,220
let's see we've got one question up here

620
00:25:09,750 --> 00:25:08,770
in the front and then we'll go to one on

621
00:25:13,200 --> 00:25:09,760
the phone line and then I'll come back

622
00:25:16,950 --> 00:25:13,210
to you leo thanks Jonathan Amos from BBC

623
00:25:18,810 --> 00:25:16,960
for Mike again you just compare what you

624
00:25:21,899 --> 00:25:18,820
have got with what you you will got give

625
00:25:23,909 --> 00:25:21,909
us a sense of just how much bigger in

626
00:25:25,440 --> 00:25:23,919
terms of you know scaleless this other

627
00:25:27,659 --> 00:25:25,450
images when you get the whole thing and

628
00:25:30,060 --> 00:25:27,669
will you sort of fill in the top as well

629
00:25:32,940 --> 00:25:30,070
so you've got the the data volume will

630
00:25:37,200 --> 00:25:32,950
be 64 times larger because these are 18

631
00:25:43,019 --> 00:25:37,210
sub down the resolution will be 8 times

632
00:25:45,960 --> 00:25:43,029
better so these are extremely reduced

633
00:25:47,970 --> 00:25:45,970
versions of what we were getting in a in

634
00:25:49,919 --> 00:25:47,980
a sense you may know we originally

635
00:25:53,250 --> 00:25:49,929
proposed zoom lenses so I'm basically

636
00:25:55,950 --> 00:25:53,260
giving you a slow motion zoom we've got

637
00:25:56,789 --> 00:25:55,960
it so we got a low resolution camera

638
00:25:58,950 --> 00:25:56,799

then we're going to take a higher

639
00:26:00,630 --> 00:25:58,960
resolution camera and eventually we'll

640
00:26:02,820 --> 00:26:00,640
use the hundred millimeter lens and

641
00:26:05,600 --> 00:26:02,830
that'll get you even closer but for now

642
00:26:07,710 --> 00:26:05,610
this is a this was pretty enough and

643
00:26:12,289 --> 00:26:07,720
interesting enough that we thought it

644
00:26:17,669 --> 00:26:16,470
we haven't filled in the top and we

645
00:26:19,649 --> 00:26:17,679
actually have let you saw there's some

646
00:26:22,620 --> 00:26:19,659
gaps in the bottom as well those are not

647
00:26:25,799 --> 00:26:22,630
really in the plan right now this is the

648
00:26:28,200 --> 00:26:25,809
first we hope will get many others and

649
00:26:29,940 --> 00:26:28,210
we hope at some point it will be guided

650
00:26:32,310 --> 00:26:29,950
by science and not by

651
00:26:34,529 --> 00:26:32,320
just taking a random picture this one

652
00:26:40,500 --> 00:26:34,539
had to be planned this one was planned

653
00:26:42,570 --> 00:26:40,510
in in November last year so what you see

654
00:26:44,250 --> 00:26:42,580
is what I thought thought and it was

655
00:26:46,560 --> 00:26:44,260
completely independent of where the

656
00:26:50,129 --> 00:26:46,570
vehicle is pointing or anything else so

657
00:26:51,990 --> 00:26:50,139
it's a it's a random shot where you sit

658
00:26:55,470 --> 00:26:52,000
you land you turn take a picture around

659
00:26:59,039 --> 00:26:55,480
you land or you you you be swirl your

660
00:27:01,529 --> 00:26:59,049
tripod and take a picture it's probably

661
00:27:03,899 --> 00:27:01,539
not the best pointed it's probably not

662
00:27:07,009 --> 00:27:03,909
does it include everything you'd want

663
00:27:09,659 --> 00:27:07,019

we're hoping as we move out of the

664
00:27:11,820 --> 00:27:09,669
characterization activity phase that we

665
00:27:15,060 --> 00:27:11,830
can start putting in and getting better

666
00:27:16,560 --> 00:27:15,070
things yeah let me add one thing about

667
00:27:18,539 --> 00:27:16,570
that because Mike raises a good point

668
00:27:20,009 --> 00:27:18,549
most of the activities that we've

669
00:27:22,139 --> 00:27:20,019
executed in this characterization

670
00:27:25,379 --> 00:27:22,149
activity phase cap phase we call it

671
00:27:27,000 --> 00:27:25,389
we're actually uploaded to the vehicle a

672
00:27:28,830 --> 00:27:27,010
couple of months ago actually in cruise

673
00:27:29,940 --> 00:27:28,840
and that's partly because we wanted to

674
00:27:30,960 --> 00:27:29,950
check them out very carefully on the

675
00:27:32,250 --> 00:27:30,970
test fit and make sure they're one

676
00:27:33,450 --> 00:27:32,260
hundred percent guaranteed to work here

677
00:27:35,220 --> 00:27:33,460
in the early days of the mission there's

678
00:27:37,470 --> 00:27:35,230
some unusual first time activities and

679
00:27:38,940 --> 00:27:37,480
we want to check them all out but also

680
00:27:40,440 --> 00:27:38,950
means we had to pre build them before we

681
00:27:41,669 --> 00:27:40,450
knew exactly what to look at right we

682
00:27:43,680 --> 00:27:41,679
didn't know exactly where Mount sharp

683
00:27:45,509 --> 00:27:43,690
was going to be and things like that but

684
00:27:48,539 --> 00:27:45,519
in addition you know Andy talked about

685
00:27:50,220 --> 00:27:48,549
about his team working on the on this

686
00:27:52,350 --> 00:27:50,230
tactical timeline that's very pressing

687
00:27:54,000 --> 00:27:52,360
so we also wanted to reduce the workload

688
00:27:56,009 --> 00:27:54,010

you know we're trying to flex our

689
00:27:57,629 --> 00:27:56,019
muscles very slowly on the rover and

690
00:27:59,549 --> 00:27:57,639
we're trying to flex some a little bit

691
00:28:00,870 --> 00:27:59,559
slowly on the team as well so we want to

692
00:28:01,919 --> 00:28:00,880
have more stuff pre built so that we

693
00:28:03,570 --> 00:28:01,929
didn't have to build you know right as

694
00:28:06,240 --> 00:28:03,580
much of that program as any was saying

695
00:28:07,259 --> 00:28:06,250
each night so as Mike indicated you know

696
00:28:09,090 --> 00:28:07,269
these are these are kind of the

697
00:28:10,590 --> 00:28:09,100
pre-canned activities and now that we

698
00:28:12,120 --> 00:28:10,600
can optimize we know where we are and we

699
00:28:14,549 --> 00:28:12,130
can we can we can do more optimal

700
00:28:17,159 --> 00:28:14,559
targeting coming up here shortly I can

701
00:28:20,310 --> 00:28:17,169
add that in the in the cap intermission

702
00:28:21,600 --> 00:28:20,320
which you've heard about and I think I

703
00:28:24,539 --> 00:28:21,610
had a question from since from the

704
00:28:27,509 --> 00:28:24,549
audience that we do have some mosaics

705
00:28:29,879 --> 00:28:27,519
that we are going to be able to move a

706
00:28:32,509 --> 00:28:29,889
little bit they were they were planned

707
00:28:36,180 --> 00:28:32,519
to be moved we have a placeholder

708
00:28:38,100 --> 00:28:36,190
positions and as we get into the phase

709
00:28:41,070 --> 00:28:38,110
where we can do that which is after the

710
00:28:42,779 --> 00:28:41,080
software update which is critically

711
00:28:43,049 --> 00:28:42,789
important to us as well as just the

712
00:28:46,619 --> 00:28:43,059
running

713
00:28:48,239 --> 00:28:46,629

the vehicle then we will move them

714
00:28:49,919 --> 00:28:48,249
around and one of those we hope to shoot

715
00:28:52,590 --> 00:28:49,929
with a hundred we don't haven't taken

716
00:28:55,200 --> 00:28:52,600
any 100 millimeter focal length camera

717
00:28:57,539 --> 00:28:55,210
images yet and they're not there are

718
00:28:59,460 --> 00:28:57,549
none that were preloaded to the vehicle

719
00:29:01,200 --> 00:28:59,470
so there's still that instrument that

720
00:29:02,999 --> 00:29:01,210
needs to be checked out and we're going

721
00:29:06,749 --> 00:29:03,009
to try to shoot the mouth sharp with

722
00:29:10,169 --> 00:29:06,759
that okay we're going next to the phone

723
00:29:12,269 --> 00:29:10,179
line Denise Chow space com go ahead hi

724
00:29:14,659 --> 00:29:12,279
thanks for taking my question I think

725
00:29:17,759 --> 00:29:14,669
this is probably for either Mike or dawn

726
00:29:19,769 --> 00:29:17,769
with the color panorama are there

727
00:29:22,109 --> 00:29:19,779
certain features that are you're better

728
00:29:23,220 --> 00:29:22,119
able to see with the color as opposed to

729
00:29:24,899 --> 00:29:23,230
black and white and are there things

730
00:29:27,720 --> 00:29:24,909
that you didn't notice at first set that

731
00:29:32,119 --> 00:29:27,730
came through in the color shots you

732
00:29:36,210 --> 00:29:32,129
wanna tell me wouldn't you take it um

733
00:29:37,769 --> 00:29:36,220
because color and an albedo color and

734
00:29:41,960 --> 00:29:37,779
brightness on Mars are often very

735
00:29:45,090 --> 00:29:41,970
closely correlated I don't see anything

736
00:29:48,960 --> 00:29:45,100
personally in the color that I didn't

737
00:29:52,289 --> 00:29:48,970
see in the the grayscale image but I'm

738
00:29:54,359 --> 00:29:52,299

trained I know what to look for and for

739
00:29:57,359 --> 00:29:54,369
I think the importance of this mosaic

740
00:29:59,609 --> 00:29:57,369
really at this point is that it can show

741
00:30:03,180 --> 00:29:59,619
everybody can see the differences and

742
00:30:06,869 --> 00:30:03,190
the color just the discolorations that

743
00:30:10,379 --> 00:30:06,879
you see around the rocket plumerias and

744
00:30:14,100 --> 00:30:10,389
the the color and brightness a--'s of

745
00:30:17,039 --> 00:30:14,110
the rocks in Mount sharp in there in the

746
00:30:18,810 --> 00:30:17,049
in the far field those are indicative of

747
00:30:20,430 --> 00:30:18,820
real differences we're not sure what the

748
00:30:22,499 --> 00:30:20,440
differences are but they're real

749
00:30:26,100 --> 00:30:22,509
differences and they're much more easily

750
00:30:28,710 --> 00:30:26,110
seen in color the human perception

751
00:30:31,080 --> 00:30:28,720
system can discriminate something on the

752
00:30:33,749 --> 00:30:31,090
order of a thousand different colors but

753
00:30:37,080 --> 00:30:33,759
only about 60 different gray scales so

754
00:30:38,759 --> 00:30:37,090
the this this gives you a thousand you

755
00:30:42,570 --> 00:30:38,769
know thousand to 60 information that

756
00:30:44,050 --> 00:30:42,580
factor of 10 more information you want

757
00:30:46,090 --> 00:30:44,060
to try

758
00:30:47,920 --> 00:30:46,100
I will say that the engineering team it

759
00:30:50,080 --> 00:30:47,930
was a little easier to see the dust and

760
00:30:52,350 --> 00:30:50,090
on the rover in the color image than it

761
00:30:55,750 --> 00:30:52,360
was on the in the in the black and white

762
00:30:58,570 --> 00:30:55,760
are we going next to Leo a night with

763
00:31:00,400 --> 00:30:58,580

Irish television these briefings take

764
00:31:01,900 --> 00:31:00,410
place just as the evening newscasts are

765
00:31:05,380 --> 00:31:01,910
going out in Europe so timing is

766
00:31:07,840 --> 00:31:05,390
important for us could you I had in my

767
00:31:10,210 --> 00:31:07,850
mind that this full res pan would be

768
00:31:12,460 --> 00:31:10,220
available tomorrow that doesn't sound

769
00:31:15,790 --> 00:31:12,470
correct now so I wonder could you be

770
00:31:18,520 --> 00:31:15,800
specific as to when you think in days of

771
00:31:21,010 --> 00:31:18,530
Earth days when you think that pan would

772
00:31:23,650 --> 00:31:21,020
be available and also when you think we

773
00:31:27,460 --> 00:31:23,660
might get a olas moms in fuller at Mount

774
00:31:30,040 --> 00:31:27,470
sharp in full in terms of Earth days and

775
00:31:33,010 --> 00:31:30,050
if I could just a supplementary how tall

776
00:31:36,300 --> 00:31:33,020
r is the rim of the crater that we're

777
00:31:38,950 --> 00:31:36,310
seeing I mean how high are those cliffs

778
00:31:40,720 --> 00:31:38,960
there are lots of parts of that i'm

779
00:31:45,340 --> 00:31:40,730
going to try address some of them Leo

780
00:31:48,490 --> 00:31:45,350
but I don't think I can do it all the I

781
00:31:52,150 --> 00:31:48,500
don't think we're going to see more than

782
00:31:55,810 --> 00:31:52,160
a couple of dozen of the full resolution

783
00:32:01,630 --> 00:31:55,820
images from this panorama until after

784
00:32:04,420 --> 00:32:01,640
the software upload and it really

785
00:32:06,880 --> 00:32:04,430
depends because that's all we're putting

786
00:32:09,240 --> 00:32:06,890
commands to low the hell the idea here

787
00:32:11,260 --> 00:32:09,250
is you take pictures with your camera

788
00:32:13,300 --> 00:32:11,270

there in your camera what do you do with

789
00:32:15,370 --> 00:32:13,310
them well you physically take the card

790
00:32:17,500 --> 00:32:15,380
out you put it into your computer well I

791
00:32:19,720 --> 00:32:17,510
can't do that with my cameras so I have

792
00:32:22,210 --> 00:32:19,730
to I have to I have to ask the rover to

793
00:32:25,180 --> 00:32:22,220
go get them and put it and we've only

794
00:32:28,020 --> 00:32:25,190
put in a request to do something like 20

795
00:32:31,450 --> 00:32:28,030
24 images to pull them out of the card

796
00:32:33,760 --> 00:32:31,460
and we and today is the last solid we

797
00:32:37,270 --> 00:32:33,770
have to be up linking commands for that

798
00:32:39,310 --> 00:32:37,280
so that's fine with me we get past that

799
00:32:43,240 --> 00:32:39,320
point now we're going to we get in a

800
00:32:46,840 --> 00:32:43,250
couple of five Sol's we get to get some

801
00:32:49,300 --> 00:32:46,850
more back we are also limited by

802
00:32:53,830 --> 00:32:49,310
bandwidth you know these are the the

803
00:32:56,930 --> 00:32:53,840
full images are going to be 24 megabits

804
00:33:00,650 --> 00:32:56,940
each they're there to two bits per pixel

805
00:33:02,570 --> 00:33:00,660
and so that's a large volume 130 of

806
00:33:04,400 --> 00:33:02,580
those frames that's you know that's

807
00:33:07,760 --> 00:33:04,410
getting up to the several hundreds of

808
00:33:10,400 --> 00:33:07,770
gigabytes of megabits some of the things

809
00:33:12,560 --> 00:33:10,410
things are going to take on during cap

810
00:33:14,870 --> 00:33:12,570
that's going to run into the into the

811
00:33:16,610 --> 00:33:14,880
gigabits and I'm not expecting to see

812
00:33:19,040 --> 00:33:16,620
many of those come back for quite a

813
00:33:23,170 --> 00:33:19,050

while we don't have the bandwidth like a

814
00:33:25,340 --> 00:33:23,180
dsl or cable so so there's that issue

815
00:33:28,790 --> 00:33:25,350
you had what was the last part of your

816
00:33:31,400 --> 00:33:28,800
question about Oh hide hide about the

817
00:33:33,110 --> 00:33:31,410
the crater wall there are two parts with

818
00:33:35,840 --> 00:33:33,120
a problem with the crater wall the

819
00:33:40,730 --> 00:33:35,850
create these northern crater wall is

820
00:33:43,700 --> 00:33:40,740
actually lower than the peak of Mount

821
00:33:45,170 --> 00:33:43,710
sharp and the the northern wall which we

822
00:33:47,600 --> 00:33:45,180
can't see because mouth sharpen is way

823
00:33:50,420 --> 00:33:47,610
is is probably a little about about

824
00:33:53,450 --> 00:33:50,430
level with them so we are obviously

825
00:33:56,060 --> 00:33:53,460
below the height of that wall but it's

826
00:33:58,100 --> 00:33:56,070
because we're not seeing out from it but

827
00:34:00,710 --> 00:33:58,110
it's probably for my recollection it's

828
00:34:04,730 --> 00:34:00,720
only about two kilometers higher than

829
00:34:06,380 --> 00:34:04,740
where we are right now okay we're going

830
00:34:07,880 --> 00:34:06,390
to go to the phone next and then we will

831
00:34:10,370 --> 00:34:07,890
come to a question in the room keys can

832
00:34:12,860 --> 00:34:10,380
go ahead keep counting guess watch calm

833
00:34:15,620 --> 00:34:12,870
question for michael watkins or anybody

834
00:34:17,030 --> 00:34:15,630
else who might answer I'm several these

835
00:34:19,220 --> 00:34:17,040
photos that have come down there's the

836
00:34:20,300 --> 00:34:19,230
augmented reality or a our tags I've

837
00:34:23,060 --> 00:34:20,310
seen several they look like little

838
00:34:24,590 --> 00:34:23,070

pixelated versions of the rover in the

839
00:34:26,300 --> 00:34:24,600
captions they say that they're going to

840
00:34:30,020 --> 00:34:26,310
be used with the future apps with

841
00:34:32,510 --> 00:34:30,030
smartphones two questions is there a nap

842
00:34:34,700 --> 00:34:32,520
under development by JPL and if so when

843
00:34:35,930 --> 00:34:34,710
are you going to release it second of

844
00:34:37,760 --> 00:34:35,940
all are these going to be you know

845
00:34:39,380 --> 00:34:37,770
closed apps where they just get pushed

846
00:34:41,750 --> 00:34:39,390
out or you can attempt to make these

847
00:34:43,130 --> 00:34:41,760
open like Google Earth and so forth so

848
00:34:44,600 --> 00:34:43,140
that other people could take the data

849
00:34:47,600 --> 00:34:44,610
and add on to it and create their own

850
00:34:49,820 --> 00:34:47,610
versions Keith I can take that one so

851
00:34:51,410 --> 00:34:49,830
I'm not sure the specific timeline for

852
00:34:54,500 --> 00:34:51,420
the the app that's going to use the the

853
00:34:56,930 --> 00:34:54,510
AR tags it's something that is in

854
00:34:59,570 --> 00:34:56,940
progress you're probably best putting a

855
00:35:01,070 --> 00:34:59,580
question to Mars EPO for that but there

856
00:35:04,100 --> 00:35:01,080
are other experiences already online

857
00:35:05,540 --> 00:35:04,110
there is a free drive online experience

858
00:35:06,950 --> 00:35:05,550
there is experience to see where

859
00:35:09,080 --> 00:35:06,960
curiosity is and see what it's getting

860
00:35:09,970 --> 00:35:09,090
up to want to learn about the rover as

861
00:35:11,560 --> 00:35:09,980
well

862
00:35:13,000 --> 00:35:11,570
and the be a Martian app but the beer

863
00:35:14,530 --> 00:35:13,010

Martian apps already open source and I

864
00:35:15,760 --> 00:35:14,540
believe there is a work in progress to

865
00:35:18,130 --> 00:35:15,770
open source all of these other ones as

866
00:35:22,300 --> 00:35:18,140
well so I hope that answers your

867
00:35:25,030 --> 00:35:22,310
question okay in the room here we're

868
00:35:28,390 --> 00:35:25,040
gonna go here in the middle thank you

869
00:35:30,280 --> 00:35:28,400
Steve Gorman with Reuters one for size

870
00:35:31,450 --> 00:35:30,290
one was the color panorama images that

871
00:35:33,070 --> 00:35:31,460
you're showing today that when were

872
00:35:36,810 --> 00:35:33,080
these taken these are taking on Sol 3

873
00:35:41,260 --> 00:35:36,820
during south rear these were taken

874
00:35:43,660 --> 00:35:41,270
eleven o'clock last night here p.m. PDT

875
00:35:45,910 --> 00:35:43,670
alright so that would be Sol 3 4 market

876
00:35:48,700 --> 00:35:45,920
yourself three on my three bars okay and

877
00:35:50,290 --> 00:35:48,710
then also what would it and those what

878
00:35:51,670 --> 00:35:50,300
health checks were done on the same run

879
00:35:53,109 --> 00:35:51,680
the same time frame the same day you

880
00:35:54,880 --> 00:35:53,119
said that you checked out a number of

881
00:35:56,560 --> 00:35:54,890
instruments and and also one of you to

882
00:35:57,790 --> 00:35:56,570
tell us that at this point what

883
00:35:59,170 --> 00:35:57,800
instruments have now been sort of

884
00:36:00,580 --> 00:35:59,180
checked in are there a number of

885
00:36:04,000 --> 00:36:00,590
instruments you sort of now checked and

886
00:36:05,950 --> 00:36:04,010
and there we've deemed him so far to be

887
00:36:07,870 --> 00:36:05,960
okay they're operable and functioning

888
00:36:09,070 --> 00:36:07,880

are well so I think for the first

889
00:36:10,720 --> 00:36:09,080
question was where they all done the

890
00:36:12,430 --> 00:36:10,730
same salt yeah everything I listed with

891
00:36:17,190 --> 00:36:12,440
assault three activity that the online

892
00:36:20,859 --> 00:36:17,200
RC check out the apxs Dan chemin and Sam

893
00:36:25,000 --> 00:36:20,869
health checks and they had both the nav

894
00:36:25,960 --> 00:36:25,010
cam and the mass cam 360 pounds that was

895
00:36:29,080 --> 00:36:25,970
all done those are all solved three

896
00:36:31,060 --> 00:36:29,090
activities the other question 1 which

897
00:36:34,599 --> 00:36:31,070
instrument I've been checked out so so

898
00:36:36,310 --> 00:36:34,609
they've all been checked out but but but

899
00:36:38,410 --> 00:36:36,320
there are different levels of checking

900
00:36:40,570 --> 00:36:38,420
them out you know we do a if i if i turn

901
00:36:42,040 --> 00:36:40,580
the circuitry on does electricity flow

902
00:36:44,099 --> 00:36:42,050
all through it you know is it you know

903
00:36:46,420 --> 00:36:44,109
is it is it is it basically working

904
00:36:47,950 --> 00:36:46,430
there was some mechanical checkouts for

905
00:36:49,540 --> 00:36:47,960
example inside Sam that have not been

906
00:36:52,060 --> 00:36:49,550
conducted connect can I move things

907
00:36:53,740 --> 00:36:52,070
around inside Sam mechanically those

908
00:36:55,570 --> 00:36:53,750
have not been done yet and then the

909
00:36:57,430 --> 00:36:55,580
scientific characterization you know the

910
00:36:59,020 --> 00:36:57,440
calibration and the full performance of

911
00:37:00,760 --> 00:36:59,030
the science instruments has not been

912
00:37:02,200 --> 00:37:00,770
conducted yet so what you know we're

913
00:37:03,520 --> 00:37:02,210

kind of just starting off slowly here

914
00:37:04,660 --> 00:37:03,530
making sure they all turn on and they

915
00:37:06,940 --> 00:37:04,670
all execute their you know their their

916
00:37:08,170 --> 00:37:06,950
first level functionality and in some

917
00:37:09,370 --> 00:37:08,180
cases we actually have that in science

918
00:37:11,260 --> 00:37:09,380
the rad instrument is working quite well

919
00:37:12,760 --> 00:37:11,270
I think Don Hossler talked about that

920
00:37:14,980 --> 00:37:12,770
you know we're getting images from from

921
00:37:17,109 --> 00:37:14,990
Mike's cameras you know so we're

922
00:37:19,240 --> 00:37:17,119
starting to you know to unroll the

923
00:37:21,250 --> 00:37:19,250
science slowly but there are these more

924
00:37:22,890 --> 00:37:21,260
advanced modes of the instruments still

925
00:37:25,140 --> 00:37:22,900
to be to be looked at

926
00:37:26,519 --> 00:37:25,150
alright thank you okay we've got one

927
00:37:27,720 --> 00:37:26,529
more caller on the line and then we'll

928
00:37:30,839 --> 00:37:27,730
come back to the room will go over now

929
00:37:32,789 --> 00:37:30,849
to en O'Neill with discovery news hi

930
00:37:34,890 --> 00:37:32,799
there it's this questions really for

931
00:37:37,349 --> 00:37:34,900
remote Watkins I was just wondering

932
00:37:41,039 --> 00:37:37,359
about the debris on top of on the deck

933
00:37:44,010 --> 00:37:41,049
of curiosity firstly what why wasn't it

934
00:37:46,559 --> 00:37:44,020
anticipated that that every of that size

935
00:37:47,609 --> 00:37:46,569
would be on top of the rover also are

936
00:37:49,200 --> 00:37:47,619
there any instruments that are

937
00:37:52,819 --> 00:37:49,210
vulnerable to it and will there be any

938
00:37:55,589 --> 00:37:52,829

follow-up study and also will these

939
00:37:58,740 --> 00:37:55,599
these pieces at every remain on the deck

940
00:38:01,829 --> 00:37:58,750
for the duration of the mission ok so

941
00:38:03,690 --> 00:38:01,839
you it was not predicted because the you

942
00:38:05,339 --> 00:38:03,700
know the propulsion folks and the you

943
00:38:06,809 --> 00:38:05,349
know the edl team they tried to figure

944
00:38:08,579 --> 00:38:06,819
out how much the pressure you know

945
00:38:10,319 --> 00:38:08,589
exerted by the engine exhaust would be

946
00:38:12,230 --> 00:38:10,329
on the Martian surface and they took a

947
00:38:14,700 --> 00:38:12,240
guess at the range of particle sizes and

948
00:38:16,890 --> 00:38:14,710
you know the date they simulated that

949
00:38:18,720 --> 00:38:16,900
and and they felt that probably wouldn't

950
00:38:20,010 --> 00:38:18,730
kick up things this big so obviously

951
00:38:22,349 --> 00:38:20,020
that means these materials lighter than

952
00:38:24,480 --> 00:38:22,359
expected or the exhaust was a little you

953
00:38:26,309 --> 00:38:24,490
know was a little stronger than expected

954
00:38:28,380 --> 00:38:26,319
or closer to the ground and expected or

955
00:38:29,880 --> 00:38:28,390
something like that but but let's let

956
00:38:30,900 --> 00:38:29,890
them look at it for a while and come

957
00:38:33,180 --> 00:38:30,910
back with a you know with a full

958
00:38:35,460 --> 00:38:33,190
explanation we don't think they have any

959
00:38:36,660 --> 00:38:35,470
impact on us right now that there were

960
00:38:39,059 --> 00:38:36,670
some potential things you know could

961
00:38:41,730 --> 00:38:39,069
have landed on top of you know the rad

962
00:38:44,819 --> 00:38:41,740
instrument detector for example but you

963
00:38:45,870 --> 00:38:44,829

saw done Hassler's results yesterday and

964
00:38:47,190 --> 00:38:45,880
they look fine and so there's no

965
00:38:49,200 --> 00:38:47,200
indication there's a problem we look at

966
00:38:52,200 --> 00:38:49,210
the deck and we don't see any anything

967
00:38:53,910 --> 00:38:52,210
like that so some of our other

968
00:38:56,640 --> 00:38:53,920
instruments could have could have you

969
00:38:58,529 --> 00:38:56,650
know been impacted by a buy one of these

970
00:39:00,029 --> 00:38:58,539
little buy one of these pebbles but we

971
00:39:01,470 --> 00:39:00,039
haven't seen any evidence of that yet so

972
00:39:02,849 --> 00:39:01,480
as far as we know via the instrument

973
00:39:05,849 --> 00:39:02,859
checkouts they didn't hit anything and

974
00:39:07,170 --> 00:39:05,859
in terms of mechanically obstructing you

975
00:39:08,609 --> 00:39:07,180
know any of the things on the rover

976
00:39:13,319 --> 00:39:08,619
though there's there's there's no

977
00:39:14,460 --> 00:39:13,329
problem with that at all okay back in

978
00:39:15,720 --> 00:39:14,470
the previous question brother was how

979
00:39:17,250 --> 00:39:15,730
long are they gonna last we don't know i

980
00:39:18,809 --> 00:39:17,260
think when we start tilting around they

981
00:39:23,460 --> 00:39:18,819
some of them will probably move around

982
00:39:24,870 --> 00:39:23,470
and fall off okay hi this is a mark

983
00:39:26,819 --> 00:39:24,880
kaufman of the washington post in

984
00:39:29,819 --> 00:39:26,829
National Geographic a question for any

985
00:39:31,799 --> 00:39:29,829
Michigan you had said that on a daily

986
00:39:33,940 --> 00:39:31,809
basis you're sending a thousand commands

987
00:39:35,650 --> 00:39:33,950
or so up to the

988
00:39:37,960 --> 00:39:35,660

up to curiosity have there been any

989
00:39:40,060 --> 00:39:37,970
anomalies or is this something that is

990
00:39:43,420 --> 00:39:40,070
going you know that it's just reading it

991
00:39:47,050 --> 00:39:43,430
in a kind of near perfect way well I

992
00:39:48,550 --> 00:39:47,060
will say that in this early set of Sol's

993
00:39:50,200 --> 00:39:48,560
with some of these things that are

994
00:39:52,960 --> 00:39:50,210
already on board the number and the

995
00:39:55,180 --> 00:39:52,970
commands being actually uploaded every

996
00:39:58,210 --> 00:39:55,190
solve is a little bit below that that

997
00:39:59,530 --> 00:39:58,220
actually is representative of really the

998
00:40:01,270 --> 00:39:59,540
combination of the things we're

999
00:40:04,060 --> 00:40:01,280
uploading and and some of these things

1000
00:40:05,650 --> 00:40:04,070
we have onboard well we anticipate we'll

1001
00:40:07,960 --> 00:40:05,660
have something of that order when we're

1002
00:40:09,069 --> 00:40:07,970
fully and then in the nominal process

1003
00:40:12,069 --> 00:40:09,079
where we don't have any of this

1004
00:40:15,240 --> 00:40:12,079
pre-built stuff but we we aren't really

1005
00:40:17,680 --> 00:40:15,250
having any any trouble getting you know

1006
00:40:21,940 --> 00:40:17,690
getting things on board we've had you

1007
00:40:24,970 --> 00:40:21,950
know some small shakedown issues just

1008
00:40:27,010 --> 00:40:24,980
related to getting in in the habit that

1009
00:40:30,450 --> 00:40:27,020
we haven't had any any serious issues

1010
00:40:33,790 --> 00:40:30,460
getting our commands on board I could

1011
00:40:35,829 --> 00:40:33,800
you were in the diagram to show that

1012
00:40:38,770 --> 00:40:35,839
both Odyssey and Amaro were being used

1013
00:40:41,890 --> 00:40:38,780

in terms of transmission how about the

1014
00:40:44,230 --> 00:40:41,900
the European satellite is is that

1015
00:40:47,020 --> 00:40:44,240
something that can and will be used well

1016
00:40:50,140 --> 00:40:47,030
we do have had plans I not sure exactly

1017
00:40:57,550 --> 00:40:50,150
which saw to to work with mex but that

1018
00:40:59,870 --> 00:40:57,560
has not been used to date go over here

1019
00:41:04,309 --> 00:40:59,880
on the Isle

1020
00:41:05,650 --> 00:41:04,319
I have two questions first for us Emily

1021
00:41:08,660 --> 00:41:05,660
locked a wall at the Planetary Society

1022
00:41:10,309 --> 00:41:08,670
for Mike what kind of downlink data

1023
00:41:11,960 --> 00:41:10,319
rates are you achieving from the rover

1024
00:41:13,579 --> 00:41:11,970
right now and when are you going to be

1025
00:41:15,140 --> 00:41:13,589
able to ramp up to the 2 megabits per

1026
00:41:20,329 --> 00:41:15,150
second that we're talking about with

1027
00:41:23,480 --> 00:41:20,339
this Mike I'm sorry you know we've we've

1028
00:41:26,660 --> 00:41:23,490
we've been up to to a few hundred K data

1029
00:41:28,430 --> 00:41:26,670
rates so far we started off very low we

1030
00:41:31,160 --> 00:41:28,440
start off at 8k and 32 k and then we

1031
00:41:34,670 --> 00:41:31,170
ramp those up slowly as each of them you

1032
00:41:37,220 --> 00:41:34,680
know proves successful probably in a

1033
00:41:39,289 --> 00:41:37,230
week or so we're going to continue to

1034
00:41:40,759 --> 00:41:39,299
increase those data rates and and turn

1035
00:41:44,269 --> 00:41:40,769
on with the specific question was a

1036
00:41:46,430 --> 00:41:44,279
adaptive data rate so so mro the radio

1037
00:41:48,230 --> 00:41:46,440
on tomorrow and the radio on on MSL they

1038
00:41:50,089 --> 00:41:48,240

can they can dynamically adjust the data

1039
00:41:51,859 --> 00:41:50,099
rate so when the link is very strong

1040
00:41:53,660 --> 00:41:51,869
when the road when the when amuro is

1041
00:41:55,220 --> 00:41:53,670
very high in the sky you can up the data

1042
00:41:57,829 --> 00:41:55,230
rate to the maximum amount up to about 2

1043
00:42:00,680 --> 00:41:57,839
megabits per second and so as we

1044
00:42:01,910 --> 00:42:00,690
continue to progress through the you

1045
00:42:03,499 --> 00:42:01,920
know through the data rates well we'll

1046
00:42:06,529 --> 00:42:03,509
get to that probably you know in a week

1047
00:42:07,579 --> 00:42:06,539
or two we're being a little bit cautious

1048
00:42:10,759 --> 00:42:07,589
here because of the flight software

1049
00:42:12,200 --> 00:42:10,769
transition but you know McMillan was

1050
00:42:13,849 --> 00:42:12,210
talking about the about the backlog of

1051
00:42:15,380 --> 00:42:13,859
data and it's pretty important to us to

1052
00:42:17,599 --> 00:42:15,390
check out the telecom system very

1053
00:42:19,069 --> 00:42:17,609
carefully and very fully so that we can

1054
00:42:21,680 --> 00:42:19,079
up these data rates and get more of the

1055
00:42:23,359 --> 00:42:21,690
data cleared out you know of the camera

1056
00:42:26,180 --> 00:42:23,369
buffers where they can stick it store

1057
00:42:27,710 --> 00:42:26,190
gigabytes of data and so we're trying to

1058
00:42:29,450 --> 00:42:27,720
get the data rates up as fast as we can

1059
00:42:32,509 --> 00:42:29,460
but we're kind of pausing during the

1060
00:42:34,400 --> 00:42:32,519
flight software transition and then for

1061
00:42:36,079 --> 00:42:34,410
male in my impression from both the nav

1062
00:42:38,210 --> 00:42:36,089
cam and the mask em images is that this

1063
00:42:39,859 --> 00:42:38,220

is a much more colorful place than we've

1064
00:42:41,779 --> 00:42:39,869
ever landed before is that a correct

1065
00:42:45,259 --> 00:42:41,789
impression and can you speak to what

1066
00:42:47,690 --> 00:42:45,269
that means scientifically that's my

1067
00:42:49,910 --> 00:42:47,700
impression as well but I've spent

1068
00:42:52,039 --> 00:42:49,920
actually almost no time looking at the

1069
00:42:53,839 --> 00:42:52,049
naf cam and I just you know just solve

1070
00:42:59,539 --> 00:42:53,849
this thing when I came in very early

1071
00:43:01,430 --> 00:42:59,549
this morning some of the coloration

1072
00:43:04,670 --> 00:43:01,440
we're seeing here really has to do with

1073
00:43:08,690 --> 00:43:04,680
the sand dune and you look at you see

1074
00:43:11,299 --> 00:43:08,700
that the the dune field is dark and in

1075
00:43:13,180 --> 00:43:11,309
this kind of a camera will look sort of

1076
00:43:16,160 --> 00:43:13,190
little bluish

1077
00:43:19,220 --> 00:43:16,170
there and so there's darks and there's

1078
00:43:22,460 --> 00:43:19,230
the red dust and there's a substrate

1079
00:43:26,180 --> 00:43:22,470
rock which is tan or let you know like

1080
00:43:28,010 --> 00:43:26,190
like tone to some type those are all the

1081
00:43:31,609 --> 00:43:28,020
basic elements that we've known from

1082
00:43:34,309 --> 00:43:31,619
ours from telescopic observations you

1083
00:43:37,339 --> 00:43:34,319
know from the 50s and 60s all the way

1084
00:43:39,500 --> 00:43:37,349
through to our most recent missions just

1085
00:43:44,420 --> 00:43:39,510
looking at color tell you enough about

1086
00:43:48,470 --> 00:43:44,430
the the composition it can also it it

1087
00:43:51,410 --> 00:43:48,480
can also be a factor of texture as we

1088
00:43:53,539 --> 00:43:51,420

found in numerous sites where we thought

1089
00:43:55,760 --> 00:43:53,549
we were seeing layers in the layers

1090
00:43:57,620 --> 00:43:55,770
rocks that had different compositions

1091
00:43:59,510 --> 00:43:57,630
yet generally they were the same

1092
00:44:01,640 --> 00:43:59,520
composition certainly nothing that you

1093
00:44:06,500 --> 00:44:01,650
could tell optically would be different

1094
00:44:09,799 --> 00:44:06,510
so the the way dust and sand are trapped

1095
00:44:11,990 --> 00:44:09,809
by a surface will also change their

1096
00:44:15,289 --> 00:44:12,000
color so I can't say it's a more

1097
00:44:17,599 --> 00:44:15,299
colorful or diverse site than others in

1098
00:44:20,359 --> 00:44:17,609
terms of just on the basis of the

1099
00:44:22,250 --> 00:44:20,369
photometry or colorimetry but obviously

1100
00:44:24,170 --> 00:44:22,260
geomorphic Lee is a very diverse place

1101
00:44:27,650 --> 00:44:24,180
and I expect we're going to see lots of

1102
00:44:30,410 --> 00:44:27,660
patterns from that if I could add

1103
00:44:33,470 --> 00:44:30,420
something to that um we've been looking

1104
00:44:35,960 --> 00:44:33,480
at the high rise and mapping and when

1105
00:44:37,760 --> 00:44:35,970
you start looking in in detail there

1106
00:44:40,130 --> 00:44:37,770
there are a lot of variations in the

1107
00:44:42,370 --> 00:44:40,140
texture and one of the things we're

1108
00:44:45,200 --> 00:44:42,380
going to be working on is mapping these

1109
00:44:49,160 --> 00:44:45,210
images we see in particular the Mardi to

1110
00:44:51,980 --> 00:44:49,170
send images onto the the high-rise ones

1111
00:44:56,329 --> 00:44:51,990
to really try to to see what that

1112
00:44:58,279 --> 00:44:56,339
diversity is and we were very excited

1113
00:45:00,019 --> 00:44:58,289

that there are a lot of things to look

1114
00:45:02,089 --> 00:45:00,029
at and as Mike said we don't know that

1115
00:45:03,620 --> 00:45:02,099
they're the same whether they're the

1116
00:45:05,900 --> 00:45:03,630
same or different compositions but they

1117
00:45:07,880 --> 00:45:05,910
certainly have different textures and

1118
00:45:13,120 --> 00:45:07,890
we're hoping the color can help us guide

1119
00:45:15,289 --> 00:45:13,130
us guide us to some variations as well

1120
00:45:19,670 --> 00:45:15,299
we're going to todd halvorson borrowers

1121
00:45:21,620 --> 00:45:19,680
lord it today in USA Today I am

1122
00:45:22,270 --> 00:45:21,630
wondering if you can tell us what you're

1123
00:45:25,030 --> 00:45:22,280
going to be doing

1124
00:45:26,370 --> 00:45:25,040
in the next 24 hours that it sounds like

1125
00:45:29,260 --> 00:45:26,380
you're going to start the software

1126
00:45:31,930 --> 00:45:29,270
upgrade and I was wondering how long

1127
00:45:35,350 --> 00:45:31,940
that takes and whether you can do

1128
00:45:40,020 --> 00:45:35,360
anything else during that upgrade earth

1129
00:45:43,000 --> 00:45:40,030
that's just what you got planned well

1130
00:45:46,930 --> 00:45:43,010
then she starts on Sulphur on Saul five

1131
00:45:51,010 --> 00:45:46,940
rather and and so those flight software

1132
00:45:53,110 --> 00:45:51,020
transition days five six seven and eight

1133
00:45:55,510 --> 00:45:53,120
we're pretty much devoted just to that

1134
00:45:57,010 --> 00:45:55,520
flight software activity and not to

1135
00:45:58,990 --> 00:45:57,020
science so we're kind of standing down

1136
00:46:01,750 --> 00:45:59,000
from science as McMillan indicated and

1137
00:46:03,130 --> 00:46:01,760
the reason is we you know we have we

1138
00:46:04,480 --> 00:46:03,140

have two computers you think about when

1139
00:46:05,920 --> 00:46:04,490
you upgrade your own software your

1140
00:46:07,090 --> 00:46:05,930
computer's down for a little bit we have

1141
00:46:09,310 --> 00:46:07,100
a bunch of copies of the flight software

1142
00:46:10,720 --> 00:46:09,320
and we have some backup copies and so

1143
00:46:12,040 --> 00:46:10,730
you know you would sort of load it into

1144
00:46:13,330 --> 00:46:12,050
one and load it into another and then

1145
00:46:15,640 --> 00:46:13,340
turn the other one on load that one on

1146
00:46:18,460 --> 00:46:15,650
and verify each of those intermediate

1147
00:46:19,960 --> 00:46:18,470
steps and and sometimes you're stuck in

1148
00:46:21,310 --> 00:46:19,970
this mode where you have you know the

1149
00:46:22,480 --> 00:46:21,320
old software on part of your computer

1150
00:46:23,950 --> 00:46:22,490
and the new software on part and we

1151
00:46:26,560 --> 00:46:23,960
didn't want to start try to do executing

1152
00:46:27,910 --> 00:46:26,570
other other you know complex activities

1153
00:46:29,980 --> 00:46:27,920
in the middle of that so we kind of

1154
00:46:32,950 --> 00:46:29,990
stand down and would be back to science

1155
00:46:35,050 --> 00:46:32,960
um the day after that's all nine this is

1156
00:46:37,390 --> 00:46:35,060
the first time I've heard Mike refer to

1157
00:46:38,890 --> 00:46:37,400
this type as a change of a software I

1158
00:46:43,960 --> 00:46:38,900
sure hope he does better than what I've

1159
00:46:45,700 --> 00:46:43,970
done on my machines we are gonna get

1160
00:46:49,270 --> 00:46:45,710
down link aren't we through this okay

1161
00:46:53,290 --> 00:46:49,280
will you up here Oh quickly and then

1162
00:46:58,540 --> 00:46:53,300
we've got just clarify what day Earth

1163
00:47:01,930 --> 00:46:58,550

Day saw five is yeah it starts ons on

1164
00:47:05,230 --> 00:47:01,940
Saturday okay it's 21 here at the front

1165
00:47:06,730 --> 00:47:05,240
of the room and again we've got about

1166
00:47:09,340 --> 00:47:06,740
five minutes left to get a couple

1167
00:47:11,530 --> 00:47:09,350
questions in a quest is Jonathan Tomas

1168
00:47:14,860 --> 00:47:11,540
BBC again that's question for Dawn in

1169
00:47:17,440 --> 00:47:14,870
your quads you showed us on the the nav

1170
00:47:19,600 --> 00:47:17,450
cam panorama where you want it to head

1171
00:47:23,530 --> 00:47:19,610
to I don't know if you could show us in

1172
00:47:25,570 --> 00:47:23,540
which quads that is and it's it's

1173
00:47:28,660 --> 00:47:25,580
actually not in any of the quads that

1174
00:47:35,980 --> 00:47:28,670
we've mapped so so the it's oh actually

1175
00:47:40,620 --> 00:47:35,990
it is it's about 120 121 134 one third

1176
00:47:44,530 --> 00:47:40,630
five so so down towards the bottom yeah

1177
00:47:47,710 --> 00:47:44,540
is is the area that I was pointing to in

1178
00:47:49,060 --> 00:47:47,720
the Nazca okay and the second part of my

1179
00:47:51,430 --> 00:47:49,070
question was has there been any

1180
00:47:54,100 --> 00:47:51,440
discussion in the science team about

1181
00:47:55,690 --> 00:47:54,110
using the chemcam laser on the on the

1182
00:47:57,340 --> 00:47:55,700
scale marks or is there so much

1183
00:47:59,740 --> 00:47:57,350
contamination there it's just it's just

1184
00:48:01,630 --> 00:47:59,750
not worth while there's been a lot of

1185
00:48:05,350 --> 00:48:01,640
discussion and there's an awful lot of

1186
00:48:15,510 --> 00:48:05,360
eagerness to know what the composition

1187
00:48:21,700 --> 00:48:17,830
calivita sky and telescope also for dawn

1188
00:48:22,990 --> 00:48:21,710

in mapping this this area with the

1189
00:48:25,660 --> 00:48:23,000
orbital imagery that you have available

1190
00:48:31,600 --> 00:48:25,670
does it look like what you expected to

1191
00:48:36,010 --> 00:48:31,610
few rocks lag deposit whatever um method

1192
00:48:37,960 --> 00:48:36,020
Oh almost none of the rocks and details

1193
00:48:42,240 --> 00:48:37,970
we can see in the foreground are visible

1194
00:48:46,480 --> 00:48:42,250
from the orbiter images and so this area

1195
00:48:49,120 --> 00:48:46,490
we identified as being smooth and we we

1196
00:48:52,720 --> 00:48:49,130
sort of have a number of units and this

1197
00:48:55,330 --> 00:48:52,730
this was one that in compiling the maps

1198
00:49:00,340 --> 00:48:55,340
it was very difficult to interpret what

1199
00:49:02,770 --> 00:49:00,350
it was and so the the images the nav cam

1200
00:49:05,260 --> 00:49:02,780
and mask am images have have given us

1201
00:49:09,190 --> 00:49:05,270
our first sense of what this terrain is

1202
00:49:11,980 --> 00:49:09,200
like and we are now you know discussing

1203
00:49:15,880 --> 00:49:11,990
what it means in the broader context

1204
00:49:17,890 --> 00:49:15,890
ways that it might have formed how we

1205
00:49:23,109 --> 00:49:17,900
can actually what observations we can

1206
00:49:25,870 --> 00:49:23,119
make to understand how it formed hey any

1207
00:49:28,330 --> 00:49:25,880
more questions here in the room all

1208
00:49:29,680 --> 00:49:28,340
right then that will be it for today but

1209
00:49:32,020 --> 00:49:29,690
I want to remind everyone that we'll be

1210
00:49:35,050 --> 00:49:32,030
back tomorrow at ten a.m. pacific time

1211
00:49:36,940 --> 00:49:35,060
we'll have a longer format press

1212
00:49:38,620 --> 00:49:36,950
conference at that time we'll have our

1213
00:49:40,570 --> 00:49:38,630

daily update but we will also have the

1214
00:49:42,880 --> 00:49:40,580
entry descent and landing team come back

1215
00:49:44,710 --> 00:49:42,890
to present their reconstructed data from

1216
00:49:46,540 --> 00:49:44,720
landing and a lot of details about that

1217
00:49:48,720 --> 00:49:46,550
so please join us again tomorrow and

1218
00:49:50,650 --> 00:49:48,730
thank you for joining us today

1219
00:51:26,070 --> 00:49:50,660
broadcasters please stand by for the