
Jet Propulsion Laboratory
California Institute of Technology
Jennifer Trosper
Justin Maki
John Grotzinger
Mike Malin
Don Hassler

1
00:00:04,940 --> 00:00:03,679
good morning and welcome to NASA's Jet

2
00:00:07,579 --> 00:00:04,950
Propulsion Laboratory in Pasadena

3
00:00:09,350 --> 00:00:07,589
California I'm Veronica McGregor we're

4
00:00:11,419 --> 00:00:09,360
going to get straight today's Mars

5
00:00:14,629 --> 00:00:11,429
report I'll introduce to you the

6
00:00:16,880 --> 00:00:14,639
speakers for today's news conference we

7
00:00:19,130 --> 00:00:16,890
have today Jennifer Trosper she's the

8
00:00:22,990 --> 00:00:19,140
Mars Science Laboratory mission manager

9
00:00:26,509 --> 00:00:23,000
she's with the Jet Propulsion Laboratory

10
00:00:28,250 --> 00:00:26,519
Justin Maki he's an imaging scientist on

11
00:00:33,590 --> 00:00:28,260
the Mars Science Laboratory mission also

12
00:00:35,780 --> 00:00:33,600
with JPL John grotzinger the project

13
00:00:39,369 --> 00:00:35,790

scientist for the mission and he's from

14
00:00:45,020 --> 00:00:41,840
Michael Mahlon principal investigator

15
00:00:46,940 --> 00:00:45,030
for the Mars descent imager on MSL he's

16
00:00:51,500 --> 00:00:46,950
with male and space science systems in

17
00:00:53,869 --> 00:00:51,510
San Diego and Don Hassler he's the rad

18
00:00:55,639 --> 00:00:53,879
principal investigator with Southwest

19
00:00:59,720 --> 00:00:55,649
Research Institute in Boulder Colorado

20
00:01:00,950 --> 00:00:59,730
and we will begin with Jennifer good

21
00:01:03,920 --> 00:01:00,960
morning well we have some great news

22
00:01:07,070 --> 00:01:03,930
Saul too has executed on the rover and

23
00:01:08,960 --> 00:01:07,080
it executed flawlessly so we

24
00:01:11,149 --> 00:01:08,970
accomplished the main things of getting

25
00:01:15,560 --> 00:01:11,159
our high gain antenna session to work

26
00:01:17,810 --> 00:01:15,570
and we have now confirmed that all of

27
00:01:20,179 --> 00:01:17,820
our antennas and all of our links on the

28
00:01:21,950 --> 00:01:20,189
rover's work perfectly and I I just want

29
00:01:24,260 --> 00:01:21,960
to congratulate Peter I lot and his team

30
00:01:26,690 --> 00:01:24,270
because there's been an enormous amount

31
00:01:28,550 --> 00:01:26,700
of effort to make sure that worked over

32
00:01:30,859 --> 00:01:28,560
the last seven years and and they are

33
00:01:33,050 --> 00:01:30,869
sending us lots and lots of data we got

34
00:01:35,719 --> 00:01:33,060
a hundred mega bits on the MRO am pass

35
00:01:38,660 --> 00:01:35,729
yesterday so fantastic work by the

36
00:01:40,760 --> 00:01:38,670
telecom team and also fantastic work by

37
00:01:42,260 --> 00:01:40,770
Odyssey and mro orbiters and the DSN

38
00:01:44,420 --> 00:01:42,270

who's been supporting us getting all

39
00:01:47,179 --> 00:01:44,430
that data back so we feel very confident

40
00:01:49,130 --> 00:01:47,189
that we have lots of data capacity now

41
00:01:50,749 --> 00:01:49,140
with all of these links and that was one

42
00:01:53,060 --> 00:01:50,759
of the major objectives of this first

43
00:01:55,700 --> 00:01:53,070
part of the mission so that's fantastic

44
00:01:58,190 --> 00:01:55,710
we also you'll note that the rover model

45
00:02:00,230 --> 00:01:58,200
now has the RSM deployed and that's

46
00:02:03,350 --> 00:02:00,240
consistent with what the actual rover on

47
00:02:05,840 --> 00:02:03,360
Mars looks like and it's pointing here

48
00:02:08,180 --> 00:02:05,850
away from the Sun and in a minute I'll

49
00:02:10,580 --> 00:02:08,190
talk a little bit about the anti Sun

50
00:02:12,600 --> 00:02:10,590
image that we took and then I also

51
00:02:14,370 --> 00:02:12,610
wanted to talk about

52
00:02:17,070 --> 00:02:14,380
the fact that we've cleared the REMS

53
00:02:19,920 --> 00:02:17,080
anomaly so we had some issues with Rams

54
00:02:22,230 --> 00:02:19,930
we understand the problem it actually

55
00:02:23,930 --> 00:02:22,240
was related to the management of rams

56
00:02:27,060 --> 00:02:23,940
parameters in their non-volatile memory

57
00:02:28,620 --> 00:02:27,070
the engineer Anthony Scuderi has been

58
00:02:30,300 --> 00:02:28,630
working with them they understand the

59
00:02:32,580 --> 00:02:30,310
problem and we're on the path to

60
00:02:33,900 --> 00:02:32,590
collecting and we actually got dated

61
00:02:36,030 --> 00:02:33,910
down that shows the instrument is

62
00:02:38,130 --> 00:02:36,040
completely healthy so I'm going to just

63
00:02:39,330 --> 00:02:38,140

ask you to explain rims the acronym and

64
00:02:41,790 --> 00:02:39,340
for those who don't know what the rims

65
00:02:43,410 --> 00:02:41,800
instrument is okay the rims instrument

66
00:02:45,180 --> 00:02:43,420
is the weather instrument that we have

67
00:02:47,370 --> 00:02:45,190
on the rover so that's the instrument

68
00:02:49,680 --> 00:02:47,380
that we had an anomaly with yesterday

69
00:02:51,479 --> 00:02:49,690
and so that's instrument is now healthy

70
00:02:52,590 --> 00:02:51,489
we got the data down to show that it's

71
00:02:55,560 --> 00:02:52,600
completely healthy and we'll be

72
00:02:58,890 --> 00:02:55,570
operating that not on Sol 3 tomorrow but

73
00:03:00,720 --> 00:02:58,900
on Southfork so all good news as far as

74
00:03:03,270 --> 00:03:00,730
the other systems on the rover the power

75
00:03:05,310 --> 00:03:03,280
system very healthy the art the

76
00:03:08,910 --> 00:03:05,320
radioisotope thermoelectric generator

77
00:03:11,670 --> 00:03:08,920
RTG that's generating power for us is a

78
00:03:13,500 --> 00:03:11,680
higher power about 115 watts and we've

79
00:03:16,080 --> 00:03:13,510
been using a conservative 105 wat

80
00:03:18,120 --> 00:03:16,090
predict so we have more power than we

81
00:03:20,100 --> 00:03:18,130
expected and that's gonna that's going

82
00:03:23,940 --> 00:03:20,110
to be fantastic for being able to keep

83
00:03:26,789 --> 00:03:23,950
the rover awake longer we also we also

84
00:03:28,800 --> 00:03:26,799
have some thermal data indicating that

85
00:03:30,930 --> 00:03:28,810
it's a little bit warmer than what our

86
00:03:33,810 --> 00:03:30,940
predicts a and we're still looking at

87
00:03:35,490 --> 00:03:33,820
why that is in general it could be that

88
00:03:37,620 --> 00:03:35,500

the environmental models are a little

89
00:03:39,479 --> 00:03:37,630
bit different for Gail it could be that

90
00:03:40,890 --> 00:03:39,489
our actual models of the rover are a

91
00:03:42,870 --> 00:03:40,900
little bit different so we're

92
00:03:45,630 --> 00:03:42,880
investigating that there's actually not

93
00:03:47,430 --> 00:03:45,640
a significant issue with that except for

94
00:03:49,229 --> 00:03:47,440
potentially we would have different

95
00:03:51,840 --> 00:03:49,239
constraints on time of day when we would

96
00:03:54,090 --> 00:03:51,850
operate the instruments an actual huge

97
00:03:55,860 --> 00:03:54,100
advantage of that is that in warming up

98
00:03:58,740 --> 00:03:55,870
actuators to do things like drive and

99
00:04:00,570 --> 00:03:58,750
move the arm will have less energy that

100
00:04:03,030 --> 00:04:00,580
we have to use to do that so we're

101
00:04:06,780 --> 00:04:03,040
looking at the thermal situation as far

102
00:04:08,880 --> 00:04:06,790
as our plans for the next saw so we're

103
00:04:11,460 --> 00:04:08,890
planning sol3 right now there's a lot of

104
00:04:13,380 --> 00:04:11,470
folks over there getting the plans and

105
00:04:16,469 --> 00:04:13,390
sequences together for the next saw and

106
00:04:18,630 --> 00:04:16,479
very exciting now that the the mast is

107
00:04:21,090 --> 00:04:18,640
deployed we're going to do the math cam

108
00:04:23,460 --> 00:04:21,100
360 full-color panorama

109
00:04:25,350 --> 00:04:23,470
and I see the folks who've been working

110
00:04:27,060 --> 00:04:25,360
on that for several months smiling back

111
00:04:28,740 --> 00:04:27,070
there and excited that it's going to run

112
00:04:30,780 --> 00:04:28,750
on Saul three just like we planned so

113
00:04:32,520 --> 00:04:30,790

they're going to be some amazing images

114
00:04:35,130 --> 00:04:32,530
from that the other thing that we're

115
00:04:36,780 --> 00:04:35,140
doing on Sol 3 is we're getting ready

116
00:04:38,400 --> 00:04:36,790
for the flight software transition so

117
00:04:40,590 --> 00:04:38,410
there been a couple folks who've been

118
00:04:43,170 --> 00:04:40,600
working for over a year on how we

119
00:04:45,480 --> 00:04:43,180
transition from the r9 flight software

120
00:04:47,580 --> 00:04:45,490
to the r10 flight software they've

121
00:04:49,980 --> 00:04:47,590
generated hundreds of files with

122
00:04:52,260 --> 00:04:49,990
thousands of commands that we have to we

123
00:04:53,580 --> 00:04:52,270
have to execute over the four Sol's of

124
00:04:55,860 --> 00:04:53,590
flight software transition and we're

125
00:04:58,770 --> 00:04:55,870
going to uplink those on the high-gain

126
00:05:00,180 --> 00:04:58,780
antenna the morning of soft 3 so that

127
00:05:01,980 --> 00:05:00,190
they're all on board and ready to go for

128
00:05:04,350 --> 00:05:01,990
this all five to nine flight software

129
00:05:05,940 --> 00:05:04,360
transition so it's very exciting we

130
00:05:07,620 --> 00:05:05,950
wanted to get this thing started on saw

131
00:05:10,650 --> 00:05:07,630
five to make sure we got to the new

132
00:05:11,910 --> 00:05:10,660
software one of the other just issues

133
00:05:13,470 --> 00:05:11,920
not a significant issue that we're

134
00:05:16,410 --> 00:05:13,480
looking at but you can see where the

135
00:05:18,990 --> 00:05:16,420
high-gain antenna is here and as Earth

136
00:05:21,060 --> 00:05:19,000
sets there's a little bit of an

137
00:05:22,680 --> 00:05:21,070
occlusion between the high-gain pointing

138
00:05:25,470 --> 00:05:22,690

through the low gain antenna at Earth

139
00:05:27,300 --> 00:05:25,480
and so we don't actually have Horizon to

140
00:05:29,160 --> 00:05:27,310
Horizon coverage of the high gain

141
00:05:31,290 --> 00:05:29,170
antenna so today we're we're going to

142
00:05:32,850 --> 00:05:31,300
operate the high-gain antenna all the

143
00:05:34,950 --> 00:05:32,860
way through earth set so we can

144
00:05:36,450 --> 00:05:34,960
characterize what the real occlusion is

145
00:05:38,580 --> 00:05:36,460
with the low gain antenna so that our

146
00:05:40,740 --> 00:05:38,590
future high gain antenna windows can can

147
00:05:44,040 --> 00:05:40,750
be consistent with what we believe the

148
00:05:48,390 --> 00:05:44,050
capability of that to be so with that

149
00:05:49,650 --> 00:05:48,400
I'd like to introduce my colleague to

150
00:05:52,080 --> 00:05:49,660
the left we were just talking we've been

151
00:05:55,650 --> 00:05:52,090
working together for 16 years we were

152
00:05:57,300 --> 00:05:55,660
both very young and not that smart on

153
00:05:58,440 --> 00:05:57,310
Mars Pathfinder and you know you can

154
00:06:02,700 --> 00:05:58,450
make an assessment of where we've come

155
00:06:05,070 --> 00:06:02,710
but Justin Maki actually built and is

156
00:06:08,510 --> 00:06:05,080
operating the has cams and the nav cams

157
00:06:14,550 --> 00:06:08,520
on MSL and if you'll bring up the first

158
00:06:18,450 --> 00:06:14,560
image here this this is the anti Sun

159
00:06:20,310 --> 00:06:18,460
image that shows that the go ahead and

160
00:06:21,660 --> 00:06:20,320
bring up the first image I think it's

161
00:06:25,530 --> 00:06:21,670
the image it's the first image in

162
00:06:27,480 --> 00:06:25,540
Justin's in Justin's package and it's

163
00:06:31,980 --> 00:06:27,490

the image if you look up here at the

164
00:06:34,470 --> 00:06:31,990
rover that we took there it is so I have

165
00:06:36,030 --> 00:06:34,480
the RSM in the position

166
00:06:37,590 --> 00:06:36,040
of where it was pointing when we took

167
00:06:40,080 --> 00:06:37,600
this image so you can see it's pointing

168
00:06:42,870 --> 00:06:40,090
down here you can see the shadow of the

169
00:06:45,060 --> 00:06:42,880
arm in the image and you can also see

170
00:06:46,380 --> 00:06:45,070
that the mast is deployed which is

171
00:06:49,320 --> 00:06:46,390
excellent that's what we're looking for

172
00:06:53,040 --> 00:06:49,330
and the reason we take this image is we

173
00:06:55,080 --> 00:06:53,050
actually did a son find to update and

174
00:06:58,170 --> 00:06:55,090
make sure that our understanding of our

175
00:07:00,000 --> 00:06:58,180
azimuth angle was correct and then we

176
00:07:03,090 --> 00:07:00,010
take the anti Sun image to make sure

177
00:07:04,920 --> 00:07:03,100
that it's 180 degrees off of what the

178
00:07:07,500 --> 00:07:04,930
the shadow is lined up with where the

179
00:07:10,200 --> 00:07:07,510
Sun is on the other side that did update

180
00:07:12,570 --> 00:07:10,210
our azimuth about a degree from what we

181
00:07:14,160 --> 00:07:12,580
had from gyro compass een but since the

182
00:07:15,870 --> 00:07:14,170
high-gain antenna session worked great

183
00:07:18,330 --> 00:07:15,880
yesterday it'll probably just work even

184
00:07:21,600 --> 00:07:18,340
better today based on that degree of

185
00:07:24,180 --> 00:07:21,610
update mar azimuth so Justin Maki again

186
00:07:25,650 --> 00:07:24,190
is the owner of the cameras who took

187
00:07:27,120 --> 00:07:25,660
this image so I'm now going to pass it

188
00:07:29,520 --> 00:07:27,130

off to him to talk about that and the

189
00:07:32,370 --> 00:07:29,530
other images that he took yesterday okay

190
00:07:35,130 --> 00:07:32,380
thanks Jennifer well this is our first

191
00:07:38,610 --> 00:07:35,140
image from the nav cam of Mars on nsl so

192
00:07:39,960 --> 00:07:38,620
it's notable in that sense not only was

193
00:07:41,970 --> 00:07:39,970
it used to check out the rover's

194
00:07:45,540 --> 00:07:41,980
attitude and positioning system which as

195
00:07:47,700 --> 00:07:45,550
you can see it did very well the the

196
00:07:49,200 --> 00:07:47,710
idea of the anti Sun images that the

197
00:07:51,180 --> 00:07:49,210
shadow should be in the center of the

198
00:07:52,770 --> 00:07:51,190
image and it may look a little off

199
00:07:54,180 --> 00:07:52,780
center but the reason that it's slightly

200
00:07:56,130 --> 00:07:54,190
off center is because we use the left

201
00:07:57,300 --> 00:07:56,140
nav cam to acquire that image so if you

202
00:07:58,500 --> 00:07:57,310
look on the left side you can see that

203
00:08:01,230 --> 00:07:58,510
that's in the center of the image and we

204
00:08:03,330 --> 00:08:01,240
verified that it's a great shot because

205
00:08:05,070 --> 00:08:03,340
it does show Mars you can see in the

206
00:08:07,050 --> 00:08:05,080
lower left portion of the image you can

207
00:08:09,680 --> 00:08:07,060
see the robotic arm there's a cover

208
00:08:12,840 --> 00:08:09,690
there with the curiosity logo on there

209
00:08:14,730 --> 00:08:12,850
there's also a what's called an

210
00:08:16,530 --> 00:08:14,740
augmented reality tag there that's that

211
00:08:18,360 --> 00:08:16,540
little pixelated a rover that's kind of

212
00:08:21,630 --> 00:08:18,370
near the center of the image and I'm

213
00:08:23,190 --> 00:08:21,640

told that this is going to be active

214
00:08:24,480 --> 00:08:23,200
once the rover starts moving and we'll

215
00:08:27,300 --> 00:08:24,490
be able to take your smartphone and

216
00:08:29,730 --> 00:08:27,310
point it at that tag and it will take

217
00:08:32,250 --> 00:08:29,740
you to a website of interest related to

218
00:08:33,420 --> 00:08:32,260
the rubber operations and the other

219
00:08:35,310 --> 00:08:33,430
thing I'm going to mention is lower

220
00:08:37,500 --> 00:08:35,320
right side of the image there you can

221
00:08:39,300 --> 00:08:37,510
see one of the rover's wheels and when

222
00:08:41,339 --> 00:08:39,310
this came down overnight we were happy

223
00:08:44,070 --> 00:08:41,349
to see that the the rover is relatively

224
00:08:45,990 --> 00:08:44,080
dust free there was some concern that we

225
00:08:47,730 --> 00:08:46,000
did kick up a lot of dust during

226
00:08:48,150 --> 00:08:47,740
landings so this image sort of shows

227
00:08:50,509 --> 00:08:48,160
that it

228
00:08:52,920 --> 00:08:50,519
really isn't that bad we do see a thin

229
00:08:57,930 --> 00:08:52,930
coating of dust but nothing nothing too

230
00:09:00,360 --> 00:08:57,940
bad so the next graphic just to give you

231
00:09:02,819 --> 00:09:00,370
a quick overview shows the napkins you

232
00:09:04,199 --> 00:09:02,829
can see there it's a stereo pair of

233
00:09:06,059 --> 00:09:04,209
cameras and the field of view is shown

234
00:09:08,759 --> 00:09:06,069
there in the image it's a 45 degree by

235
00:09:11,550 --> 00:09:08,769
45 degree field of view and the cameras

236
00:09:13,800 --> 00:09:11,560
are designed to provide navigation and

237
00:09:16,470 --> 00:09:13,810
planning assistance so we do 360-degree

238
00:09:20,040 --> 00:09:16,480

panoramas and use those stereo images to

239
00:09:23,040 --> 00:09:20,050
do Drive planning and science instrument

240
00:09:26,819 --> 00:09:23,050
targeting so the cameras were built here

241
00:09:28,740 --> 00:09:26,829
at JPL they are copies of the Emmy Ark

242
00:09:31,199 --> 00:09:28,750
napkins which they're identical we call

243
00:09:33,210 --> 00:09:31,209
that a build to print development so we

244
00:09:36,530 --> 00:09:33,220
take the same design that we used on the

245
00:09:42,059 --> 00:09:36,540
last mission we built them for msl and

246
00:09:44,759 --> 00:09:42,069
they they're working very nicely as that

247
00:09:46,259 --> 00:09:44,769
image showed we checked checked out the

248
00:09:47,850 --> 00:09:46,269
cameras with that image and we're very

249
00:09:51,119 --> 00:09:47,860
happy all the exposure times are as

250
00:09:53,759 --> 00:09:51,129
expected and go ahead and go to the next

251
00:09:57,749 --> 00:09:53,769
graphic after we did that image we went

252
00:09:59,699 --> 00:09:57,759
ahead and acquired a 360 degree panorama

253
00:10:01,259 --> 00:09:59,709
and so this graphic shows the thumbnail

254
00:10:04,110 --> 00:10:01,269
images from that panorama which are

255
00:10:06,179 --> 00:10:04,120
these little 64 x 64 pixel images that

256
00:10:09,420 --> 00:10:06,189
take a very little data volume so we

257
00:10:11,699 --> 00:10:09,430
download down like those over the UHF

258
00:10:13,259 --> 00:10:11,709
pass tonight put together this mosaic

259
00:10:15,569 --> 00:10:13,269
and I should mention that these mosaics

260
00:10:18,019 --> 00:10:15,579
are being also generated here at JPL by

261
00:10:20,100 --> 00:10:18,029
the multi-mission image processing lab

262
00:10:21,660 --> 00:10:20,110
so we're going to be down linking the

263
00:10:23,519 --> 00:10:21,670

full-frame versions of the full

264
00:10:25,769 --> 00:10:23,529
resolution versions of these images over

265
00:10:29,400 --> 00:10:25,779
the next day or two the next graphic

266
00:10:32,340 --> 00:10:29,410
shows what we call a polar projection we

267
00:10:34,920 --> 00:10:32,350
also took in panorama of the deck we

268
00:10:37,139 --> 00:10:34,930
call that the deck pan and we took this

269
00:10:39,480 --> 00:10:37,149
to document the state of the deck after

270
00:10:41,370 --> 00:10:39,490
landing it's still a low resolution

271
00:10:42,720 --> 00:10:41,380
because this is also generated from

272
00:10:45,090 --> 00:10:42,730
thumbnail images but you can see the

273
00:10:47,670 --> 00:10:45,100
rover there North is up in that deck

274
00:10:48,960 --> 00:10:47,680
graphic the RTGS on the left side the

275
00:10:50,759 --> 00:10:48,970
front of the rover is on the right side

276
00:10:53,840 --> 00:10:50,769
you can see the shadow of the RSM there

277
00:10:56,370 --> 00:10:53,850
pointing pointing to the to the right

278
00:10:58,049 --> 00:10:56,380
and if you look closely you can see the

279
00:10:59,310 --> 00:10:58,059
wheels there on the bottom the bottom

280
00:11:02,280 --> 00:10:59,320
side of the river there

281
00:11:03,330 --> 00:11:02,290
that's just sort of precursor of things

282
00:11:05,130 --> 00:11:03,340
to come we're going to get the full

283
00:11:05,970 --> 00:11:05,140
resolution versions of those images down

284
00:11:11,550 --> 00:11:05,980
and we're looking forward to getting

285
00:11:14,640 --> 00:11:11,560
those so the the next slide shows the

286
00:11:16,680 --> 00:11:14,650
first two full frame images that we've

287
00:11:19,020 --> 00:11:16,690
down linked from the our 360 degree now

288
00:11:21,300 --> 00:11:19,030

can't panorama this is just a great shot

289
00:11:23,970 --> 00:11:21,310
it's pointed to the north it's a mosaic

290
00:11:26,490 --> 00:11:23,980
it's we call it a 2 x 1 mosaic you can

291
00:11:28,890 --> 00:11:26,500
see in the near field the scour marks

292
00:11:30,630 --> 00:11:28,900
that the descent engines made on the

293
00:11:32,760 --> 00:11:30,640
surface which kicked up some of that

294
00:11:35,580 --> 00:11:32,770
dust that we saw in those has cam images

295
00:11:37,110 --> 00:11:35,590
on landing day and as you go out towards

296
00:11:40,230 --> 00:11:37,120
the horizon and near the middle of the

297
00:11:42,060 --> 00:11:40,240
image is sort of sloping down hill and

298
00:11:44,040 --> 00:11:42,070
then there's a little little drop-off

299
00:11:45,440 --> 00:11:44,050
there about the middle of the image it's

300
00:11:47,280 --> 00:11:45,450
a little hard to tell on the graphic but

301
00:11:50,340 --> 00:11:47,290
beyond that you go all the way out to

302
00:11:54,720 --> 00:11:50,350
the horizon you can see the north crater

303
00:11:57,120 --> 00:11:54,730
rim of Gale Crater so this image is just

304
00:11:58,890 --> 00:11:57,130
fantastic especially for those of us

305
00:12:01,140 --> 00:11:58,900
that worked on developing these cameras

306
00:12:03,840 --> 00:12:01,150
and we're very excited to see the system

307
00:12:06,960 --> 00:12:03,850
working and based on what we've gotten

308
00:12:08,820 --> 00:12:06,970
in the last 12 hours were we've declared

309
00:12:11,130 --> 00:12:08,830
the nav cams commissioned and ready for

310
00:12:12,630 --> 00:12:11,140
use and with that I will turn it over to

311
00:12:14,400 --> 00:12:12,640
John to talk a little bit more about

312
00:12:17,490 --> 00:12:14,410
what's in the image right thanks Justin

313
00:12:20,340 --> 00:12:17,500

okay so if we can go ahead to the next

314
00:12:23,130 --> 00:12:20,350
one there you'll see the same image that

315
00:12:26,040 --> 00:12:23,140
Justin was just talking about and we are

316
00:12:27,960 --> 00:12:26,050
looking to the north and so that's the

317
00:12:30,330 --> 00:12:27,970
rim of gale crater and that's the part

318
00:12:32,490 --> 00:12:30,340
of the rim of the crater which is lowest

319
00:12:34,680 --> 00:12:32,500
in elevation facing the the northern

320
00:12:37,110 --> 00:12:34,690
lowlands of Mars so it's been very

321
00:12:38,580 --> 00:12:37,120
deeply dissected and the thing that

322
00:12:41,040 --> 00:12:38,590
really struck the science team about

323
00:12:42,750 --> 00:12:41,050
this image that you would really be

324
00:12:44,460 --> 00:12:42,760
forgiven for thinking that NASA was

325
00:12:46,350 --> 00:12:44,470
trying to pull a fast one on you and we

326
00:12:49,050 --> 00:12:46,360
actually put a rover at the Mojave

327
00:12:54,030 --> 00:12:49,060
Desert and took a picture a little la

328
00:12:55,560 --> 00:12:54,040
smog coming in there and so the the

329
00:12:58,500 --> 00:12:55,570
thing the thing that's amazing about

330
00:13:00,060 --> 00:12:58,510
this is it to a certain extent the first

331
00:13:02,700 --> 00:13:00,070
impression that you get is how

332
00:13:05,520 --> 00:13:02,710
earth-like the seams looking at that at

333
00:13:07,230 --> 00:13:05,530
that landscape and and maybe one of the

334
00:13:08,910 --> 00:13:07,240
reasons behind it is that you're also

335
00:13:10,110 --> 00:13:08,920
looking in the same direction that this

336
00:13:13,320 --> 00:13:10,120
alluvial fan has come

337
00:13:15,120 --> 00:13:13,330
from so all the sedimentary materials

338
00:13:16,980 --> 00:13:15,130

all the the part not necessarily the

339
00:13:20,280 --> 00:13:16,990
things you're looking at that's all TBD

340
00:13:22,110 --> 00:13:20,290
but more more distally what we can

341
00:13:23,850 --> 00:13:22,120
really confirm in terms of looking at

342
00:13:26,130 --> 00:13:23,860
the high-rise images is that all those

343
00:13:27,870 --> 00:13:26,140
materials are derived from erosion of

344
00:13:29,579 --> 00:13:27,880
those those mountains there that's the

345
00:13:32,430 --> 00:13:29,589
that's the source region for this

346
00:13:34,320 --> 00:13:32,440
material so it's it's really kind of

347
00:13:36,960 --> 00:13:34,330
fantastic to look out across there and

348
00:13:39,750 --> 00:13:36,970
and see something that has really

349
00:13:41,610 --> 00:13:39,760
attracted people to particular parts of

350
00:13:43,500 --> 00:13:41,620
Mars for your wondering ears wondering

351
00:13:45,240 --> 00:13:43,510
what would it look like if you landed on

352
00:13:47,310 --> 00:13:45,250
a on a landscape where there was an

353
00:13:49,470 --> 00:13:47,320
alluvial fan that was created by water

354
00:13:52,350 --> 00:13:49,480
so that there you're looking into

355
00:13:55,170 --> 00:13:52,360
towards the watershed that delivered

356
00:13:58,170 --> 00:13:55,180
those materials so in the middle ground

357
00:14:01,050 --> 00:13:58,180
you can see some dark looking Reggie

358
00:14:04,230 --> 00:14:01,060
features those are scarps probably a

359
00:14:06,900 --> 00:14:04,240
meter two metres three metres and height

360
00:14:09,870 --> 00:14:06,910
we have no idea what what those really

361
00:14:14,070 --> 00:14:09,880
are they're related to the bedrock that

362
00:14:17,400 --> 00:14:14,080
we exposed it's you're looking in toward

363
00:14:19,050 --> 00:14:17,410

the the high thermal inertia area over

364
00:14:21,840 --> 00:14:19,060
there and then in the immediate

365
00:14:25,740 --> 00:14:21,850
foreground you you see this this little

366
00:14:28,560 --> 00:14:25,750
low that Justin mesh in so at a very low

367
00:14:32,790 --> 00:14:28,570
slope a degree or two away from the

368
00:14:35,579 --> 00:14:32,800
rover into that depression there we

369
00:14:37,140 --> 00:14:35,589
don't yet know geo morphologically what

370
00:14:39,240 --> 00:14:37,150
that means but there is some kind of a

371
00:14:40,949 --> 00:14:39,250
low there and then right in the

372
00:14:42,750 --> 00:14:40,959
foreground is something that's

373
00:14:44,269 --> 00:14:42,760
particularly interesting Justin

374
00:14:48,990 --> 00:14:44,279
mentioned these are the thruster

375
00:14:50,760 --> 00:14:49,000
impingement excavation areas and what's

376
00:14:53,820 --> 00:14:50,770
cool about this is that we got some free

377
00:14:55,560 --> 00:14:53,830
trenching on em er we often discussed

378
00:14:58,650 --> 00:14:55,570
you know we how we would take the wheel

379
00:15:00,269 --> 00:14:58,660
and scuff and dig and we did and you

380
00:15:01,980 --> 00:15:00,279
know people like Rob Sullivan put a lot

381
00:15:04,740 --> 00:15:01,990
of effort into that and we'll do that

382
00:15:06,390 --> 00:15:04,750
with this with this rover curiosity but

383
00:15:08,550 --> 00:15:06,400
here we get a freebie right off the bat

384
00:15:11,400 --> 00:15:08,560
so if we zoom in what's really cool

385
00:15:14,190 --> 00:15:11,410
about this we're going to zoom into the

386
00:15:16,380 --> 00:15:14,200
mark on the side and we estimate right

387
00:15:17,699 --> 00:15:16,390
now is just chatting with Justin too bad

388
00:15:21,120 --> 00:15:17,709

we're going to guess that this is

389
00:15:23,640 --> 00:15:21,130
approximately a half a meter and with

390
00:15:24,060 --> 00:15:23,650
their what you see beneath the soil is

391
00:15:26,250 --> 00:15:24,070
bed

392
00:15:28,080 --> 00:15:26,260
rock and for those of you that may

393
00:15:30,450 --> 00:15:28,090
remember the phoenix landing you

394
00:15:32,160 --> 00:15:30,460
excavated and what were you looking for

395
00:15:34,470 --> 00:15:32,170
with phoenix you're looking for ice and

396
00:15:36,690 --> 00:15:34,480
so what what we're really looking for

397
00:15:38,810 --> 00:15:36,700
here is the diversity materials and so

398
00:15:42,180 --> 00:15:38,820
we see our first glimpse of bedrock and

399
00:15:45,260 --> 00:15:42,190
and so apparently there is a harder

400
00:15:48,030 --> 00:15:45,270
rockier material beneath this veneer of

401
00:15:49,920 --> 00:15:48,040
gravel and pebbles and you know

402
00:15:52,710 --> 00:15:49,930
obviously there's some impact ejecta in

403
00:15:55,050 --> 00:15:52,720
there as well and so we're all getting a

404
00:15:57,000 --> 00:15:55,060
glimpse into the subsurface here so for

405
00:15:59,310 --> 00:15:57,010
example when we turn the Dan instrument

406
00:16:01,770 --> 00:15:59,320
on for its check out and intermission

407
00:16:04,020 --> 00:16:01,780
will drive along and we'll want to know

408
00:16:05,610 --> 00:16:04,030
what's in the subsurface and and here

409
00:16:08,010 --> 00:16:05,620
we've already got an exploration hole

410
00:16:09,660 --> 00:16:08,020
drilled for us so when we interpret that

411
00:16:12,780 --> 00:16:09,670
data we actually have some understanding

412
00:16:14,340 --> 00:16:12,790
of the depth to bedrock for for

413
00:16:16,470 --> 00:16:14,350

understand you know understanding what

414
00:16:19,440 --> 00:16:16,480
the subsurface is that we've never done

415
00:16:21,420 --> 00:16:19,450
before with a rover mission so with that

416
00:16:23,010 --> 00:16:21,430
just a little teaser as to what's to

417
00:16:24,360 --> 00:16:23,020
come in the future and I'm going to turn

418
00:16:28,200 --> 00:16:24,370
it over to Mike to show you some really

419
00:16:29,580 --> 00:16:28,210
cool stuff thank you John I've acted two

420
00:16:34,350 --> 00:16:29,590
things I'm going to share with you today

421
00:16:38,490 --> 00:16:34,360
the first is not really directly related

422
00:16:41,310 --> 00:16:38,500
to my role on MSL but to my role in the

423
00:16:45,960 --> 00:16:41,320
MRO project on the team leader for the

424
00:16:49,560 --> 00:16:45,970
imaging system on mro and one of my team

425
00:16:53,600 --> 00:16:49,570
members from my company was targeting

426
00:16:55,980 --> 00:16:53,610
mro up here as part of her duties and

427
00:16:58,200 --> 00:16:55,990
she brought to my attention the first

428
00:16:59,760 --> 00:16:58,210
thing I'm going to show you i'm gonna i

429
00:17:01,080 --> 00:16:59,770
need to set the stage because it's going

430
00:17:03,300 --> 00:17:01,090
to come on the screen that could flash

431
00:17:06,179 --> 00:17:03,310
off after a couple of seconds what

432
00:17:08,550 --> 00:17:06,189
you're going to see is a a picture that

433
00:17:12,030 --> 00:17:08,560
we took on august first of the landing

434
00:17:15,960 --> 00:17:12,040
area and they obviously the lander and

435
00:17:18,449 --> 00:17:15,970
its other pieces are not in that image

436
00:17:21,000 --> 00:17:18,459
and then the second image you'll see

437
00:17:23,490 --> 00:17:21,010
it'll come up in a two seconds later is

438
00:17:25,439 --> 00:17:23,500

going to be the image we took on the

439
00:17:27,390 --> 00:17:25,449
seventh at the same time that high-rise

440
00:17:28,740 --> 00:17:27,400
was taking the picture that you've seen

441
00:17:31,260 --> 00:17:28,750
that I think they're pictures in the

442
00:17:33,900 --> 00:17:31,270
back of the room of that and so we wrote

443
00:17:35,520 --> 00:17:33,910
along with the high-rise the context

444
00:17:38,690 --> 00:17:35,530
camera is a much lower resolution

445
00:17:42,630 --> 00:17:38,700
camera its 120th the resolution of

446
00:17:45,840 --> 00:17:42,640
high-rise so we 20 times poorer so we

447
00:17:47,730 --> 00:17:45,850
get 6 meter per pixel take the image 5

448
00:17:50,550 --> 00:17:47,740
meters when we map projected so that we

449
00:17:53,250 --> 00:17:50,560
can compare image to image and but we

450
00:17:55,290 --> 00:17:53,260
also cover 50 times more area that

451
00:17:59,040 --> 00:17:55,300
high-rise does our swath width is

452
00:18:00,780 --> 00:17:59,050
typically 30 kilometers wide and the

453
00:18:03,240 --> 00:18:00,790
this particular image had a 42

454
00:18:06,390 --> 00:18:03,250
kilometers we were looking sideways at

455
00:18:10,020 --> 00:18:06,400
the surface and the the entire image is

456
00:18:12,090 --> 00:18:10,030
like 275 kilometers long so we cover a

457
00:18:15,360 --> 00:18:12,100
huge section of Mars when we take these

458
00:18:18,030 --> 00:18:15,370
images Lilia was looking at the the

459
00:18:20,400 --> 00:18:18,040
after image and she found something

460
00:18:22,170 --> 00:18:20,410
that's something a little odd so I'll

461
00:18:24,780 --> 00:18:22,180
draw your attention when we when the

462
00:18:28,740 --> 00:18:24,790
pictures come up look to the right side

463
00:18:30,780 --> 00:18:28,750

sort of down range from the from the

464
00:18:32,490 --> 00:18:30,790
area where the other pieces of the

465
00:18:35,040 --> 00:18:32,500
vehicle fell so we can have the first

466
00:18:37,110 --> 00:18:35,050
graphic it'll basically flash between

467
00:18:40,620 --> 00:18:37,120
that's the pre that's the after there's

468
00:18:42,210 --> 00:18:40,630
the before there is the after there is a

469
00:18:44,430 --> 00:18:42,220
before and look over at the right by

470
00:18:45,840 --> 00:18:44,440
that little Mesa and there's just to the

471
00:18:48,560 --> 00:18:45,850
upper left of that Mesa you see these

472
00:18:52,800 --> 00:18:48,570
little black things flicking on and off

473
00:18:57,030 --> 00:18:52,810
ok so will you blew that up and if we go

474
00:18:59,280 --> 00:18:57,040
to the next slide they'll also be

475
00:19:04,410 --> 00:18:59,290
another flickering image no and then

476
00:19:06,750 --> 00:19:04,420
they see six spots what are those six

477
00:19:09,180 --> 00:19:06,760
spots well Lily of you enough to go

478
00:19:11,280 --> 00:19:09,190
asking via kinloch can educate min and

479
00:19:14,160 --> 00:19:11,290
he saw this on the screen from the door

480
00:19:16,110 --> 00:19:14,170
of our room isn't what's that because it

481
00:19:19,290 --> 00:19:16,120
was very it's very obvious to people who

482
00:19:23,040 --> 00:19:19,300
know Mars Lillian and Ken know Mars very

483
00:19:26,550 --> 00:19:23,050
well and very obvious to people who

484
00:19:28,950 --> 00:19:26,560
studied of Gale that these were

485
00:19:35,610 --> 00:19:28,960
different and basically those are the

486
00:19:38,010 --> 00:19:35,620
six entry ballast masses I bm's I guess

487
00:19:42,060 --> 00:19:38,020
they're called they're 25 kilogram

488
00:19:44,010 --> 00:19:42,070

tungsten slugs about this big they hit

489
00:19:46,530 --> 00:19:44,020
the surface and they disturb the surface

490
00:19:48,780 --> 00:19:46,540
and these these particular things are

491
00:19:51,480 --> 00:19:48,790
about 12 kilometers down

492
00:19:55,680 --> 00:19:51,490
range from the lander they have about a

493
00:19:58,100 --> 00:19:55,690
one kilometre dispersal and these were

494
00:20:01,230 --> 00:19:58,110
what was thrown off just before the

495
00:20:03,330 --> 00:20:01,240
straighten up and fly right phase just

496
00:20:05,190 --> 00:20:03,340
before parachute came out these deaths

497
00:20:07,350 --> 00:20:05,200
they and they felt follow there's their

498
00:20:10,590 --> 00:20:07,360
separate path to the surface and that's

499
00:20:12,990 --> 00:20:10,600
where they hit so it was a great fine by

500
00:20:15,510 --> 00:20:13,000
Lilia and we're all very pleased that it

501
00:20:17,130 --> 00:20:15,520
worked and the edl guys were very

502
00:20:19,980 --> 00:20:17,140
excited to see these because this is a

503
00:20:22,920 --> 00:20:19,990
another test of all the modeling they've

504
00:20:24,600 --> 00:20:22,930
done for edl this tells them how inert

505
00:20:26,340 --> 00:20:24,610
objects that aren't doing any activity

506
00:20:28,290 --> 00:20:26,350
come through the atmosphere and fall

507
00:20:32,490 --> 00:20:28,300
there are other pieces that we will look

508
00:20:35,700 --> 00:20:32,500
once once mro is allowed to turn its

509
00:20:38,520 --> 00:20:35,710
payload back on we will be able to do

510
00:20:41,730 --> 00:20:38,530
that test go look for for these other

511
00:20:44,160 --> 00:20:41,740
large features so so that's what my

512
00:20:47,250 --> 00:20:44,170
first story we were all very excited

513
00:20:49,050 --> 00:20:47,260

about that yesterday next slide is going

514
00:20:50,880 --> 00:20:49,060
to show you an animal next thing is

515
00:20:53,790 --> 00:20:50,890
going to show you an animation this is

516
00:20:56,970 --> 00:20:53,800
going to be the first 25 seconds of the

517
00:20:58,680 --> 00:20:56,980
video in thumbnail form you're inside

518
00:21:00,480 --> 00:20:58,690
the vehicle inside the astral Cheryl she

519
00:21:04,080 --> 00:21:00,490
also you didn't see anything and then

520
00:21:05,760 --> 00:21:04,090
the ETF elevator so so the first part of

521
00:21:07,470 --> 00:21:05,770
that you were in the dark because there

522
00:21:10,920 --> 00:21:07,480
was no light inside the aeroshell and

523
00:21:14,750 --> 00:21:10,930
then it popped off and you saw it moving

524
00:21:17,100 --> 00:21:14,760
away this is again a thumbnail

525
00:21:19,920 --> 00:21:17,110
resolution video but it gives you an

526
00:21:22,410 --> 00:21:19,930
idea of sort of the kind of action we're

527
00:21:26,520 --> 00:21:22,420
going to see in the near future and that

528
00:21:28,620 --> 00:21:26,530
that that was six seconds of dark at the

529
00:21:30,300 --> 00:21:28,630
beginning inside that all was taken

530
00:21:34,320 --> 00:21:30,310
about two and a half minutes before we

531
00:21:35,600 --> 00:21:34,330
hit we landed the next slide is going to

532
00:21:38,400 --> 00:21:35,610
show you something you've seen before

533
00:21:41,100 --> 00:21:38,410
this is the thumbnail that I showed a

534
00:21:43,710 --> 00:21:41,110
couple days ago of the heat shield at a

535
00:21:45,480 --> 00:21:43,720
distance of about 15 meters heat shields

536
00:21:48,510 --> 00:21:45,490
about four and a half meters across and

537
00:21:51,330 --> 00:21:48,520
the next slide shows you the full

538
00:21:53,550 --> 00:21:51,340

resolution system came back and and

539
00:21:55,380 --> 00:21:53,560
you've been hearing us keep saying well

540
00:21:57,660 --> 00:21:55,390
just wait till you see the good stuff

541
00:22:00,390 --> 00:21:57,670
well this is the good stuff came down

542
00:22:02,010 --> 00:22:00,400
and it's quite spectacular you can

543
00:22:05,400 --> 00:22:02,020
actually see the stitch

544
00:22:08,070 --> 00:22:05,410
in the in the heat in the the thermal

545
00:22:11,190 --> 00:22:08,080
blanket you can see there's wiring in

546
00:22:12,810 --> 00:22:11,200
there for the medley experiment and so

547
00:22:15,150 --> 00:22:12,820
eventually we hope to have that same

548
00:22:18,780 --> 00:22:15,160
animation I just showed you it this

549
00:22:22,380 --> 00:22:18,790
resolution so I was actually going to do

550
00:22:24,060 --> 00:22:22,390
a couple of these thumbnail than full

551
00:22:26,160 --> 00:22:24,070
resolution was but don't have the time

552
00:22:29,430 --> 00:22:26,170
for that so the next slide is going to

553
00:22:32,040 --> 00:22:29,440
show you a high resolution view of the

554
00:22:35,190 --> 00:22:32,050
vehicle sitting on the ground this is

555
00:22:37,620 --> 00:22:35,200
the camera is a seven tenths of a meter

556
00:22:39,420 --> 00:22:37,630
off the ground and it's looking down

557
00:22:44,250 --> 00:22:39,430
this is a view the camera will have from

558
00:22:46,410 --> 00:22:44,260
now on it turns out is about nine-tenths

559
00:22:49,980 --> 00:22:46,420
of meter wide so it's about a yard wide

560
00:22:52,290 --> 00:22:49,990
and once you do this map projection to

561
00:22:55,530 --> 00:22:52,300
get it out i get the distortion out of

562
00:22:57,480 --> 00:22:55,540
the lens and you can see a pebble there

563
00:22:58,800 --> 00:22:57,490

that's five centimeters across you can

564
00:23:01,140 --> 00:22:58,810
see most of the material there is

565
00:23:03,690 --> 00:23:01,150
smaller than that and so this is the

566
00:23:05,250 --> 00:23:03,700
gravel that's covering the surface we

567
00:23:07,170 --> 00:23:05,260
actually are seeing some color

568
00:23:09,510 --> 00:23:07,180
differences in the material but I don't

569
00:23:11,820 --> 00:23:09,520
believe them because i think the the way

570
00:23:14,700 --> 00:23:11,830
the bear filter is reacting to that is

571
00:23:17,190 --> 00:23:14,710
is being spoofed by the illumination

572
00:23:21,510 --> 00:23:17,200
conditions so that something that's

573
00:23:23,880 --> 00:23:21,520
darker is looking colored but we tim

574
00:23:26,280 --> 00:23:23,890
parker has been working on a super res

575
00:23:28,950 --> 00:23:26,290
because we took hundreds of this image

576
00:23:31,230 --> 00:23:28,960
and he's been putting them to adding the

577
00:23:33,240 --> 00:23:31,240
co adding them together and we're

578
00:23:35,160 --> 00:23:33,250
getting spectacular spatial resolution

579
00:23:36,990 --> 00:23:35,170
out of that this image is slightly out

580
00:23:39,480 --> 00:23:37,000
of focus because the camera is not in

581
00:23:41,130 --> 00:23:39,490
focus at the surface but it's not as

582
00:23:44,240 --> 00:23:41,140
much out of focus as I thought it was

583
00:23:49,950 --> 00:23:44,250
going to be so it really is really nice

584
00:23:53,400 --> 00:23:49,960
the next one I think is another flicker

585
00:23:56,790 --> 00:23:53,410
yes this is a high-rise view this is the

586
00:24:00,720 --> 00:23:56,800
grey one is a high-rise scale a base map

587
00:24:03,510 --> 00:24:00,730
the colored one is the Marty taken from

588
00:24:07,140 --> 00:24:03,520

an altitude of about 170 meters which is

589
00:24:08,820 --> 00:24:07,150
about 44 seconds before touchdown and

590
00:24:12,900 --> 00:24:08,830
the field of view what you're looking at

591
00:24:15,330 --> 00:24:12,910
there is about 215 by 150 meters that

592
00:24:19,170 --> 00:24:15,340
little white box is the sigh

593
00:24:24,030 --> 00:24:19,180
of the rover and the and it's located

594
00:24:25,530 --> 00:24:24,040
where we know from the closer images

595
00:24:27,780 --> 00:24:25,540
where we can match up rocks and things

596
00:24:31,110 --> 00:24:27,790
like that it's we know that it's

597
00:24:33,600 --> 00:24:31,120
positioned where the rover is and if you

598
00:24:35,070 --> 00:24:33,610
it's very hard to show you at this scale

599
00:24:36,930 --> 00:24:35,080
you're projecting and things like that

600
00:24:38,730 --> 00:24:36,940
you should look at the image that's

601
00:24:40,410 --> 00:24:38,740
going to be on the web if you look at

602
00:24:42,150 --> 00:24:40,420
there's a bunch of rocks and boulders in

603
00:24:45,390 --> 00:24:42,160
the upper left corner of that image

604
00:24:46,920 --> 00:24:45,400
there's also some bed forms a low land

605
00:24:50,490 --> 00:24:46,930
bed forms in that crater to the lower

606
00:24:52,710 --> 00:24:50,500
left sewed amid the not the lowest left

607
00:24:54,240 --> 00:24:52,720
but in the middle left there there are

608
00:24:58,380 --> 00:24:54,250
all sorts of things there's a very very

609
00:25:00,750 --> 00:24:58,390
sharp little rock to the south east the

610
00:25:04,350 --> 00:25:00,760
southwest of the rover by probably looks

611
00:25:06,630 --> 00:25:04,360
like 50 meters but you know I look at

612
00:25:08,610 --> 00:25:06,640
this and I say well I don't you know

613
00:25:10,920 --> 00:25:08,620

they're plenty of places we can go to

614
00:25:13,020 --> 00:25:10,930
something question about can we move the

615
00:25:15,060 --> 00:25:13,030
rover is it safe to move the rover

616
00:25:16,830 --> 00:25:15,070
there's nothing around it so we can it's

617
00:25:18,810 --> 00:25:16,840
safe to move the rover there's nothing

618
00:25:22,830 --> 00:25:18,820
under it because we do have an image

619
00:25:25,200 --> 00:25:22,840
closer in as well and so today's

620
00:25:27,660 --> 00:25:25,210
presentation for marty was basically to

621
00:25:28,740 --> 00:25:27,670
fulfill the promise we said if you wait

622
00:25:31,020 --> 00:25:28,750
a little while we'll have slightly

623
00:25:33,450 --> 00:25:31,030
better pictures they're more than

624
00:25:35,550 --> 00:25:33,460
slightly better and and I think they

625
00:25:37,590 --> 00:25:35,560
they show you that the party took some

626
00:25:39,540 --> 00:25:37,600
really good image on the way down with

627
00:25:41,460 --> 00:25:39,550
that I'm going to have you done thank

628
00:25:44,370 --> 00:25:41,470
you Mike well it's really tough to

629
00:25:46,920 --> 00:25:44,380
compete with these fantastic images but

630
00:25:49,020 --> 00:25:46,930
I'm going to report snapshot of the

631
00:25:51,030 --> 00:25:49,030
first observations we have of the

632
00:25:53,430 --> 00:25:51,040
radiation environment on the surface of

633
00:25:55,380 --> 00:25:53,440
another planet which in itself I think

634
00:25:57,900 --> 00:25:55,390
is quite remarkable interestingly

635
00:26:01,230 --> 00:25:57,910
interestingly enough yesterday was the

636
00:26:04,290 --> 00:26:01,240
hundred year anniversary of the the

637
00:26:07,530 --> 00:26:04,300
discovery of galactic cosmic rays on

638
00:26:11,070 --> 00:26:07,540

earth by Victor Hesse with his hot-air

639
00:26:13,050 --> 00:26:11,080
balloon in eastern Germany and exactly

640
00:26:14,310 --> 00:26:13,060
one hundred years later yesterday we

641
00:26:15,870 --> 00:26:14,320
make the first measurements or

642
00:26:17,820 --> 00:26:15,880
characterize the first measurements of

643
00:26:20,340 --> 00:26:17,830
collected cosmic rays and the rest of

644
00:26:23,330 --> 00:26:20,350
the radiation spectrum from the surface

645
00:26:26,490 --> 00:26:23,340
of Mars so if we have the next slide

646
00:26:28,250 --> 00:26:26,500
this shows basically zooming in on the

647
00:26:31,910 --> 00:26:28,260
top deck of the rover

648
00:26:33,410 --> 00:26:31,920
showing where the red window is so the

649
00:26:36,230 --> 00:26:33,420
radiation assessment detector or rad

650
00:26:38,270 --> 00:26:36,240
field of view is defined for the charged

651
00:26:40,450 --> 00:26:38,280
particle channel by this this window and

652
00:26:42,890 --> 00:26:40,460
that points towards the zenith and so we

653
00:26:44,450 --> 00:26:42,900
characterize and measure charged

654
00:26:47,480 --> 00:26:44,460
particle radiation coming in from the

655
00:26:50,030 --> 00:26:47,490
atmosphere as well as neutral particle

656
00:26:52,490 --> 00:26:50,040
radiation neutrons and gamma-rays and a

657
00:26:53,660 --> 00:26:52,500
lot we've learned a lot since in the

658
00:26:56,330 --> 00:26:53,670
last hundred years since the

659
00:26:59,300 --> 00:26:56,340
measurements of Victor has we know that

660
00:27:00,980 --> 00:26:59,310
if you'll show the next slide that the

661
00:27:03,200 --> 00:27:00,990
two types of radiation in space the

662
00:27:05,630 --> 00:27:03,210
galactic cosmic rays and solar energetic

663
00:27:07,640 --> 00:27:05,640

particles are driven in a large part by

664
00:27:09,620 --> 00:27:07,650
the Sun they go with the solar cycle and

665
00:27:12,980 --> 00:27:09,630
it's actually a very interesting time

666
00:27:14,810 --> 00:27:12,990
because the entire nominal mission

667
00:27:17,750 --> 00:27:14,820
surface operations will be right around

668
00:27:19,940 --> 00:27:17,760
solar maximum you can see the data in

669
00:27:22,640 --> 00:27:19,950
white and the prediction of the solar

670
00:27:25,190 --> 00:27:22,650
cycle in red so we'll have an

671
00:27:28,370 --> 00:27:25,200
opportunity to to really get a good

672
00:27:29,810 --> 00:27:28,380
characterization of both the galactic

673
00:27:31,670 --> 00:27:29,820
cosmic ray background which is what

674
00:27:33,740 --> 00:27:31,680
Victor Hess measured a hundred years ago

675
00:27:36,830 --> 00:27:33,750
but also the solar energetic particles

676
00:27:40,310 --> 00:27:36,840
as they occur in solar particle events

677
00:27:43,790 --> 00:27:40,320
as a result of flares or solar storms on

678
00:27:47,420 --> 00:27:43,800
the Sun so if you if you take a look at

679
00:27:48,860 --> 00:27:47,430
this profile this is basically sunspot

680
00:27:51,920 --> 00:27:48,870
number as a function of the solar cycle

681
00:27:54,590 --> 00:27:51,930
collect the cosmic rays very an 11-year

682
00:27:57,110 --> 00:27:54,600
cycle solar energetic particles are

683
00:27:59,360 --> 00:27:57,120
episodic they they happen on a scale of

684
00:28:01,700 --> 00:27:59,370
hours to days and they can be very

685
00:28:03,770 --> 00:28:01,710
intense the first measurements we had

686
00:28:07,880 --> 00:28:03,780
yesterday the Sun was very quiet in a

687
00:28:10,640 --> 00:28:07,890
location of Mars so the measurements we

688
00:28:12,020 --> 00:28:10,650

have are pretty much primarily galactic

689
00:28:14,300 --> 00:28:12,030
cosmic rays but if you show the next

690
00:28:16,700 --> 00:28:14,310
slide this is really just a snapshot of

691
00:28:19,850 --> 00:28:16,710
pretty close to the raw data that we

692
00:28:21,980 --> 00:28:19,860
that we observe with rad from the

693
00:28:23,810 --> 00:28:21,990
surface so there's a couple of things to

694
00:28:26,510 --> 00:28:23,820
note this was a three and a half hour

695
00:28:29,180 --> 00:28:26,520
observation with about one minute time

696
00:28:33,830 --> 00:28:29,190
resolution or 11 observation one frame

697
00:28:35,750 --> 00:28:33,840
per minute of data storage and this is

698
00:28:37,610 --> 00:28:35,760
really a plot of dose rate in arbitrary

699
00:28:40,570 --> 00:28:37,620
units because we haven't well first of

700
00:28:42,310 --> 00:28:40,580
all the mast hadn't been deployed yet so

701
00:28:45,039 --> 00:28:42,320
the the mass was partially obstructing

702
00:28:47,860 --> 00:28:45,049
our field of view secondly we haven't

703
00:28:50,200 --> 00:28:47,870
corrected for the RTG background nor

704
00:28:52,149 --> 00:28:50,210
have we done a correction for the

705
00:28:53,560 --> 00:28:52,159
silicon and our plastic detectors we

706
00:28:55,570 --> 00:28:53,570
have two different types of detectors on

707
00:28:58,000 --> 00:28:55,580
rad so these are really arbitrary units

708
00:29:01,870 --> 00:28:58,010
but we have put just for reference the

709
00:29:04,779 --> 00:29:01,880
average dose rate that we observed in

710
00:29:06,310 --> 00:29:04,789
during cruise we had seven and a little

711
00:29:08,380 --> 00:29:06,320
over seven months of observations during

712
00:29:11,529 --> 00:29:08,390
cruise to to characterize read and get a

713
00:29:13,330 --> 00:29:11,539

very good baseline in deep space and now

714
00:29:16,240 --> 00:29:13,340
we are starting to take our measurements

715
00:29:18,039 --> 00:29:16,250
on the surface to to characterize the

716
00:29:21,190 --> 00:29:18,049
radiation environment on the surface so

717
00:29:23,860 --> 00:29:21,200
although this is a quiet time on on the

718
00:29:25,570 --> 00:29:23,870
surface of Mars there's really not a

719
00:29:28,659 --> 00:29:25,580
large contribution from solar energetic

720
00:29:31,779 --> 00:29:28,669
particles you can see that the spikes in

721
00:29:34,269 --> 00:29:31,789
those in that in that plot are really

722
00:29:36,009 --> 00:29:34,279
individual heavy ion hits on the

723
00:29:37,810 --> 00:29:36,019
detectors and it's and it's actually the

724
00:29:40,149 --> 00:29:37,820
contribution from these heavy ions that

725
00:29:42,000 --> 00:29:40,159
that are the biggest effect for

726
00:29:45,250 --> 00:29:42,010
biological organisms whether it be

727
00:29:48,700 --> 00:29:45,260
microbial life on Mars or astronauts on

728
00:29:51,250 --> 00:29:48,710
future missions to Mars and so what we

729
00:29:54,610 --> 00:29:51,260
will achieve with rad over the next days

730
00:29:57,460 --> 00:29:54,620
months and years will be to characterize

731
00:30:01,060 --> 00:29:57,470
and accumulate the statistics and also

732
00:30:02,740 --> 00:30:01,070
to gather energy spectra of each of

733
00:30:04,629 --> 00:30:02,750
these heavy ion events basically we

734
00:30:07,450 --> 00:30:04,639
record as I mentioned we record the

735
00:30:08,919 --> 00:30:07,460
spectra of 26 different charged

736
00:30:11,289 --> 00:30:08,929
particles so we're going to accumulate

737
00:30:14,919 --> 00:30:11,299
spectra energy spectra from each one of

738
00:30:16,899 --> 00:30:14,929

these 26 different charged particles so

739
00:30:19,870 --> 00:30:16,909
that we can understand and characterize

740
00:30:21,549 --> 00:30:19,880
their contribution to the radiation dose

741
00:30:23,320 --> 00:30:21,559
on the surface as well as the

742
00:30:27,070 --> 00:30:23,330
contribution from neutrons so this is

743
00:30:30,100 --> 00:30:27,080
really a just a snapshot but we do see

744
00:30:31,659 --> 00:30:30,110
that the you know the exciting elements

745
00:30:34,419 --> 00:30:31,669
of what we're going to be collecting and

746
00:30:36,220 --> 00:30:34,429
accumulating over the next months and

747
00:30:40,029 --> 00:30:36,230
years as we go continue on with our na

748
00:30:41,910 --> 00:30:40,039
mano mission so stay tuned for future

749
00:30:44,160 --> 00:30:41,920
results

750
00:30:45,840 --> 00:30:44,170
thank you all right thank you we're

751
00:30:47,250 --> 00:30:45,850
going to begin with questions here at

752
00:30:48,540 --> 00:30:47,260
the Jet Propulsion Laboratory and then

753
00:30:50,820 --> 00:30:48,550
we will take some questions by phone

754
00:30:53,550 --> 00:30:50,830
lines as well and i'll start with eric

755
00:30:55,260 --> 00:30:53,560
and i saw that hand go up first let's

756
00:31:00,690 --> 00:30:55,270
just wait for a microphone to come over

757
00:31:03,390 --> 00:31:00,700
to you thanks yeah Eric ham with nature

758
00:31:05,310 --> 00:31:03,400
I guess my question is for John I wonder

759
00:31:07,890 --> 00:31:05,320
if we can bring up that image of the the

760
00:31:09,960 --> 00:31:07,900
close up the half meter sort of scale

761
00:31:12,540 --> 00:31:09,970
with the trenching in the trench but

762
00:31:16,320 --> 00:31:12,550
from the retrorockets is that something

763
00:31:18,210 --> 00:31:16,330

we can bring up it'll just take them

764
00:31:19,230 --> 00:31:18,220
okay and I guess my question is I don't

765
00:31:20,940 --> 00:31:19,240
know if I'm seeing things but seemed

766
00:31:25,410 --> 00:31:20,950
like there might be some sort of linea

767
00:31:27,330 --> 00:31:25,420
mint there maybe even that's echoed at

768
00:31:29,580 --> 00:31:27,340
the top of the trench I wonder if you

769
00:31:30,870 --> 00:31:29,590
have any thoughts on what that could be

770
00:31:32,130 --> 00:31:30,880
all I'm thinking of is is when

771
00:31:34,290 --> 00:31:32,140
opportunity recently discovered that

772
00:31:36,330 --> 00:31:34,300
gypsum vein so I'm wondering if if

773
00:31:38,460 --> 00:31:36,340
already you could speculate on what what

774
00:31:44,850 --> 00:31:38,470
could create a linear feature like that

775
00:31:47,250 --> 00:31:44,860
Thanks um I guess sure why not I mean

776
00:31:49,470 --> 00:31:47,260
that's an entirely reasonable suggestion

777
00:31:53,400 --> 00:31:49,480
and you know it's something that the

778
00:31:55,410 --> 00:31:53,410
team was talking about and I I think you

779
00:31:58,050 --> 00:31:55,420
know we should just wait to get the the

780
00:32:01,980 --> 00:31:58,060
mask am data down to go further with

781
00:32:05,040 --> 00:32:01,990
that one but yeah it's a it's a

782
00:32:07,170 --> 00:32:05,050
reasonable idea that there could be

783
00:32:14,720 --> 00:32:07,180
fractures filled with some cementing

784
00:32:18,090 --> 00:32:16,740
take one more question here and then I

785
00:32:21,270 --> 00:32:18,100
will go to a question on the phone line

786
00:32:25,050 --> 00:32:21,280
next hello Olli songy and Joe space come

787
00:32:27,990 --> 00:32:25,060
from France I would like to speak about

788
00:32:29,250 --> 00:32:28,000

the temperature and the radiations you

789
00:32:31,910 --> 00:32:29,260
said that the temperature was a bit

790
00:32:33,900 --> 00:32:31,920
higher than expected are you today

791
00:32:37,140 --> 00:32:33,910
completely comfortable with the

792
00:32:39,450 --> 00:32:37,150
condition on Mars about the rover or as

793
00:32:43,140 --> 00:32:39,460
I my dear problem for example with

794
00:32:44,610 --> 00:32:43,150
winter etc yeah I'll start and then day

795
00:32:47,610 --> 00:32:44,620
and if you want to add anything you can

796
00:32:49,830 --> 00:32:47,620
um as far as the rover itself we don't

797
00:32:52,320 --> 00:32:49,840
have any concerns about the temperature

798
00:32:54,090 --> 00:32:52,330
being a little higher in fact normally

799
00:32:56,280 --> 00:32:54,100
when we land on Mars we update our

800
00:32:58,020 --> 00:32:56,290
thermal models and predictions and the

801
00:33:00,120 --> 00:32:58,030
model of the rover to be consistent with

802
00:33:01,980 --> 00:33:00,130
what we see so that's part of the

803
00:33:05,280 --> 00:33:01,990
process we're taking a lot of telemetry

804
00:33:08,610 --> 00:33:05,290
we actually woke up several times over

805
00:33:10,440 --> 00:33:08,620
night last night to get telemetry points

806
00:33:12,030 --> 00:33:10,450
all through the night and what we'll do

807
00:33:14,220 --> 00:33:12,040
with those is well update our models

808
00:33:16,470 --> 00:33:14,230
they may put different constraints but

809
00:33:18,360 --> 00:33:16,480
not significant constraints that we

810
00:33:21,260 --> 00:33:18,370
didn't expect maybe we would have if

811
00:33:23,850 --> 00:33:21,270
things get too warm we might have a

812
00:33:25,740 --> 00:33:23,860
shorter operating time before we had to

813
00:33:28,020 --> 00:33:25,750

let something like the cameras for

814
00:33:29,910 --> 00:33:28,030
example cool down but we're still we're

815
00:33:31,580 --> 00:33:29,920
still working on that in fact though the

816
00:33:34,590 --> 00:33:31,590
higher temperatures are generally

817
00:33:36,750 --> 00:33:34,600
fantastic for us because the real the

818
00:33:38,100 --> 00:33:36,760
real issue we struggle with is how much

819
00:33:40,200 --> 00:33:38,110
energy we have to use to heat the

820
00:33:43,680 --> 00:33:40,210
actuators to drive and use the arm and

821
00:33:44,880 --> 00:33:43,690
this is good news on that front you know

822
00:33:47,130 --> 00:33:44,890
I think from an instrument point of view

823
00:33:49,170 --> 00:33:47,140
all of these temperatures are within the

824
00:33:51,810 --> 00:33:49,180
operating range of our instruments so I

825
00:33:53,790 --> 00:33:51,820
think it's interesting but all the

826
00:34:00,060 --> 00:33:53,800
models typically have a variation and

827
00:34:02,140 --> 00:34:00,070
and I think we're within that the RTG

828
00:34:04,000 --> 00:34:02,150
background is a fraction of the

829
00:34:09,380 --> 00:34:04,010
measurement the radiation we observe

830
00:34:10,880 --> 00:34:09,390
from space okay let's go next to kim

831
00:34:14,270 --> 00:34:10,890
chang new york times he's on the phone

832
00:34:18,409 --> 00:34:14,280
line go ahead hi this is forgot your

833
00:34:20,240 --> 00:34:18,419
thoughts here the bedrock do you see

834
00:34:26,419 --> 00:34:20,250
would that be part of the result crater

835
00:34:27,560 --> 00:34:26,429
floor or Parvati Osbourne later can I

836
00:34:30,190 --> 00:34:27,570
think if I heard it correctly you're

837
00:34:36,050 --> 00:34:30,200
asking if that's the floor of the crater

838
00:34:38,240 --> 00:34:36,060

or some later bedrock yeah yeah I think

839
00:34:41,630 --> 00:34:38,250
given the elevation and and the

840
00:34:43,100 --> 00:34:41,640
projection of the of the geometry of the

841
00:34:47,930 --> 00:34:43,110
room and the crater it would be pretty

842
00:34:51,290 --> 00:34:47,940
high up to be the floor of the crater so

843
00:34:54,919 --> 00:34:51,300
you know with lots of caveats I guess

844
00:34:59,570 --> 00:34:54,929
our initial first guess is that it could

845
00:35:04,790 --> 00:34:59,580
potentially be a you know a a rock unit

846
00:35:07,240 --> 00:35:04,800
and I want to put rock in quotations you

847
00:35:10,760 --> 00:35:07,250
know that forms sometime well after and

848
00:35:13,130 --> 00:35:10,770
i put in quotations because we don't

849
00:35:14,930 --> 00:35:13,140
know how hard it is yet and and there's

850
00:35:17,420 --> 00:35:14,940
you know people have different feelings

851
00:35:20,630 --> 00:35:17,430
about how hard and material needs to be

852
00:35:23,810 --> 00:35:20,640
before it's a rock and well and we'll

853
00:35:25,610 --> 00:35:23,820
find out so I'll just leave it leave it

854
00:35:34,820 --> 00:35:25,620
at that but it's probably not the floor

855
00:35:37,070 --> 00:35:34,830
of the Creator okay I saw Emily luck to

856
00:35:38,510 --> 00:35:37,080
all his hand if you bring the mic to her

857
00:35:39,800 --> 00:35:38,520
and then we'll do one over here and then

858
00:35:41,210 --> 00:35:39,810
another one from the phones go ahead

859
00:35:43,310 --> 00:35:41,220
Emily hi Emily locked a wall of the

860
00:35:46,130 --> 00:35:43,320
Planetary Society I'm wondering like the

861
00:35:48,290 --> 00:35:46,140
the Rockets excavated pretty deep and

862
00:35:49,970 --> 00:35:48,300
which means that the soil you're sitting

863
00:35:52,820 --> 00:35:49,980

on is pretty disturbed i'm wondering if

864
00:35:54,530 --> 00:35:52,830
you want to sample that disturbed soil

865
00:35:57,140 --> 00:35:54,540
originally are you gonna have to drive a

866
00:36:00,080 --> 00:35:57,150
way to get to some more undisturbed soil

867
00:36:01,910 --> 00:36:00,090
before you start with the arm work well

868
00:36:04,820 --> 00:36:01,920
that that's a that's a great question

869
00:36:06,830 --> 00:36:04,830
and i can i can say that's at the at the

870
00:36:08,690 --> 00:36:06,840
core of the the team discussion right

871
00:36:11,330 --> 00:36:08,700
now because there's obviously an

872
00:36:13,610 --> 00:36:11,340
opportunity there and the question is

873
00:36:14,850 --> 00:36:13,620
you know what if we would use the

874
00:36:16,560 --> 00:36:14,860
instruments there

875
00:36:19,410 --> 00:36:16,570
you know we have this thing called

876
00:36:22,140 --> 00:36:19,420
intermission that we don't have to drive

877
00:36:25,080 --> 00:36:22,150
anywhere if we don't want to you know

878
00:36:27,510 --> 00:36:25,090
driving is an option there and and as

879
00:36:30,060 --> 00:36:27,520
far as the contamination goes you know

880
00:36:31,710 --> 00:36:30,070
as far as the hydrazine and potential

881
00:36:34,560 --> 00:36:31,720
combustion products that are related to

882
00:36:37,110 --> 00:36:34,570
it we've done a lot of studies in

883
00:36:39,600 --> 00:36:37,120
particular ira cats here at JPL has

884
00:36:41,700 --> 00:36:39,610
really followed up on that and i think

885
00:36:43,080 --> 00:36:41,710
most of us have reasonable level of

886
00:36:44,940 --> 00:36:43,090
confidence now we don't have to worry

887
00:36:47,700 --> 00:36:44,950
too much about it that within us all or

888
00:36:51,270 --> 00:36:47,710

to even for the Sam instrument it

889
00:36:52,710 --> 00:36:51,280
doesn't pose too much of a of any kind

890
00:36:55,620 --> 00:36:52,720
of a risk even with regard to

891
00:36:58,260 --> 00:36:55,630
interpretation of science data so it's

892
00:37:00,210 --> 00:36:58,270
it's definitely it's a bird in the hand

893
00:37:01,740 --> 00:37:00,220
right there and I think we have to

894
00:37:05,280 --> 00:37:01,750
evaluate it very carefully and think

895
00:37:06,270 --> 00:37:05,290
about what we might do there okay

896
00:37:07,500 --> 00:37:06,280
actually we're going to take one on the

897
00:37:09,480 --> 00:37:07,510
phone line and then we'll come back to

898
00:37:12,030 --> 00:37:09,490
li it's a tu leo so go ahead on the

899
00:37:14,760 --> 00:37:12,040
phone please I keep coming from a swatch

900
00:37:16,680 --> 00:37:14,770
calm a question with regards to the time

901
00:37:19,140 --> 00:37:16,690
lag with releasing images JPL's been

902
00:37:22,350 --> 00:37:19,150
pretty darn fast and releasing Cassini

903
00:37:24,510 --> 00:37:22,360
images raw and the twitter / images but

904
00:37:26,070 --> 00:37:24,520
i guess the question is with you've got

905
00:37:28,130 --> 00:37:26,080
a yard tag on there i mean you guys are

906
00:37:30,570 --> 00:37:28,140
really pushing the envelope of immediacy

907
00:37:32,310 --> 00:37:30,580
but even though the rover can't see

908
00:37:34,170 --> 00:37:32,320
small stuff they can see larger stuff

909
00:37:36,450 --> 00:37:34,180
and having walked around in places like

910
00:37:38,850 --> 00:37:36,460
Devon I one myself things of a

911
00:37:39,930 --> 00:37:38,860
biological origin jump out at you no I'm

912
00:37:41,460 --> 00:37:39,940
not I'm not going to ask you if you're

913
00:37:42,600 --> 00:37:41,470

going to find stromatolite sore banded

914
00:37:44,910 --> 00:37:42,610
iron formations or anything like that

915
00:37:46,680 --> 00:37:44,920
but if you're going to release these

916
00:37:50,340 --> 00:37:46,690
images and something jumps up that is

917
00:37:52,770 --> 00:37:50,350
clearly anomalous possibly of biological

918
00:37:54,360 --> 00:37:52,780
or something origin we would hold that

919
00:37:56,430 --> 00:37:54,370
image we just put that image out there

920
00:37:57,690 --> 00:37:56,440
and what is the process I mean to

921
00:37:59,670 --> 00:37:57,700
somebody sit there and screen these

922
00:38:02,490 --> 00:37:59,680
things and say oops that looks like it's

923
00:38:03,750 --> 00:38:02,500
not just natural and you have a process

924
00:38:04,890 --> 00:38:03,760
that you can actually you know release

925
00:38:07,740 --> 00:38:04,900
or put on the web it explains exactly

926
00:38:13,380 --> 00:38:07,750
how NASA willkommen JPL will handle that

927
00:38:16,170 --> 00:38:13,390
information you know we're going to have

928
00:38:18,810 --> 00:38:16,180
to you know we'll just see how it goes I

929
00:38:20,280 --> 00:38:18,820
would say that you know our policy right

930
00:38:21,300 --> 00:38:20,290
now is to release all the images and

931
00:38:23,880 --> 00:38:21,310
they come out there and if there's a

932
00:38:25,200 --> 00:38:23,890
stromatolite there then you know if

933
00:38:26,030 --> 00:38:25,210
somebody wants to interpret it that way

934
00:38:28,910 --> 00:38:26,040
there

935
00:38:31,160 --> 00:38:28,920
come to it are our feeling is generally

936
00:38:36,800 --> 00:38:31,170
that we're not really worried too much

937
00:38:39,080 --> 00:38:36,810
about what folks beyond the team might

938
00:38:41,480 --> 00:38:39,090

want to interpret in terms of features

939
00:38:43,250 --> 00:38:41,490
that we might see because our approach

940
00:38:46,490 --> 00:38:43,260
to this is always going to be to take a

941
00:38:48,770 --> 00:38:46,500
very integrated look using all the

942
00:38:50,720 --> 00:38:48,780
instruments think carefully about what

943
00:38:52,970 --> 00:38:50,730
we're doing and then make a statement so

944
00:38:55,460 --> 00:38:52,980
if there was ever anything as profound

945
00:38:57,230 --> 00:38:55,470
as what you're describing we would take

946
00:38:58,610 --> 00:38:57,240
our time with it no matter how much

947
00:39:04,790 --> 00:38:58,620
jumping up and down there might be in

948
00:39:08,720 --> 00:39:04,800
the background okay we're going next to

949
00:39:10,850 --> 00:39:08,730
Leo Leo Enright with Irish television

950
00:39:12,500 --> 00:39:10,860
for dr. Hosler the first cosmic-ray

951
00:39:14,810 --> 00:39:12,510
experiment on the moon was an Irish

952
00:39:16,730 --> 00:39:14,820
experiment by the Dublin Institute for

953
00:39:18,670 --> 00:39:16,740
Advanced Study so there's a lot of Irish

954
00:39:22,190 --> 00:39:18,680
interest in this cosmic ray detector

955
00:39:23,930 --> 00:39:22,200
believe it or not and I agree I was

956
00:39:25,430 --> 00:39:23,940
wondering I mean recent Guinness even

957
00:39:27,590 --> 00:39:25,440
looking at the early date obviously the

958
00:39:29,420 --> 00:39:27,600
data set will be very very large at the

959
00:39:31,910 --> 00:39:29,430
end of it what do you hope from it and

960
00:39:33,290 --> 00:39:31,920
can you say even at this stage what it

961
00:39:34,880 --> 00:39:33,300
would be like for a man or a woman

962
00:39:36,560 --> 00:39:34,890
standing on the surface from what you've

963
00:39:38,480 --> 00:39:36,570

seen so far what sort of radiation

964
00:39:39,980 --> 00:39:38,490
dosage well certainly there's there's a

965
00:39:41,480 --> 00:39:39,990
number of models which would predict

966
00:39:43,430 --> 00:39:41,490
what the level of radiation would be on

967
00:39:45,890 --> 00:39:43,440
the surface of Mars but it's a complex

968
00:39:48,470 --> 00:39:45,900
environment the atmosphere modifies the

969
00:39:50,900 --> 00:39:48,480
radiation spectra and so does the

970
00:39:52,750 --> 00:39:50,910
surface characterizing the neutron

971
00:39:55,370 --> 00:39:52,760
environment on the surface is one of the

972
00:40:00,590 --> 00:39:55,380
most interesting questions or the least

973
00:40:02,030 --> 00:40:00,600
constrained measurements from models so

974
00:40:03,740 --> 00:40:02,040
that those will be some of the most

975
00:40:06,410 --> 00:40:03,750
exciting measurements but the rad

976
00:40:09,230 --> 00:40:06,420
instrument is much more than just a

977
00:40:12,110 --> 00:40:09,240
simple dosimeter the simple plot of dose

978
00:40:14,630 --> 00:40:12,120
as a function of time is really like a

979
00:40:16,970 --> 00:40:14,640
thumbnail from from an image point of

980
00:40:18,440 --> 00:40:16,980
view it's the energy spectra that'll be

981
00:40:20,510 --> 00:40:18,450
interesting and it's the energy spectra

982
00:40:21,800 --> 00:40:20,520
as a function of time and so to compare

983
00:40:23,630 --> 00:40:21,810
those spectra for each of the different

984
00:40:25,730 --> 00:40:23,640
particle types and to be able to compare

985
00:40:27,830 --> 00:40:25,740
those back and fold them those back into

986
00:40:31,700 --> 00:40:27,840
the transport models I think is really

987
00:40:33,170 --> 00:40:31,710
our goal and I think understanding the

988
00:40:35,180 --> 00:40:33,180

transport means that we can improve our

989
00:40:37,070 --> 00:40:35,190
modeling and therefore we feed that back

990
00:40:39,650 --> 00:40:37,080
in and fold that back in so that we can

991
00:40:41,180 --> 00:40:39,660
design the most effective shielding

992
00:40:45,620 --> 00:40:41,190
or astronauts when we send them some

993
00:40:47,539 --> 00:40:45,630
ours in the future okay query can wake

994
00:40:49,099 --> 00:40:47,549
up to the front here and then we will go

995
00:40:53,089 --> 00:40:49,109
back to another one on the phone lines

996
00:40:57,349 --> 00:40:53,099
i'm todd halvorson florida today and USA

997
00:41:00,200 --> 00:40:57,359
Today for John the nab cam panorama is

998
00:41:02,450 --> 00:41:00,210
kind of your first look at the

999
00:41:05,779 --> 00:41:02,460
neighborhood if you will and I was

1000
00:41:09,559 --> 00:41:05,789
wondering what your media thoughts are

1001
00:41:14,510 --> 00:41:09,569
about the scientific potential of the

1002
00:41:16,010 --> 00:41:14,520
site you have landed on oh I you know I

1003
00:41:18,680 --> 00:41:16,020
think it's uh I think it's incredibly

1004
00:41:21,260 --> 00:41:18,690
high I mean everything that we see their

1005
00:41:25,339 --> 00:41:21,270
suggests a remarkable range of diversity

1006
00:41:28,760 --> 00:41:25,349
and I chose to single out the issue of

1007
00:41:30,680 --> 00:41:28,770
the depth of the soil because you know

1008
00:41:32,720 --> 00:41:30,690
this is a question that that Mars

1009
00:41:35,029 --> 00:41:32,730
scientists have wondered about for a

1010
00:41:37,160 --> 00:41:35,039
long time and we have an instrument now

1011
00:41:38,510 --> 00:41:37,170
the Dan instrument which can you know

1012
00:41:40,549 --> 00:41:38,520
reach down to a depth of fifty

1013
00:41:42,950 --> 00:41:40,559

centimeters and look for hydrogen

1014
00:41:44,690 --> 00:41:42,960
bearing substances and and what that

1015
00:41:47,510 --> 00:41:44,700
images shows us right away is that it's

1016
00:41:49,519 --> 00:41:47,520
not going to be ice so we're good for

1017
00:41:52,339 --> 00:41:49,529
planetary protection on that one as as

1018
00:41:54,559 --> 00:41:52,349
promised and instead it looks like

1019
00:41:56,660 --> 00:41:54,569
bedrock and when that instrument was

1020
00:41:58,640 --> 00:41:56,670
first built I believe that the hope was

1021
00:42:01,490 --> 00:41:58,650
that it might it might search for ice

1022
00:42:03,079 --> 00:42:01,500
one day and in the meantime all these

1023
00:42:06,980 --> 00:42:03,089
hydrated minerals were discovered on

1024
00:42:08,690 --> 00:42:06,990
Mars so in terms of applying it as a way

1025
00:42:10,190 --> 00:42:08,700
of viewing mineralogy and the subsurface

1026
00:42:12,529 --> 00:42:10,200
that we're driving across I think it's

1027
00:42:14,380 --> 00:42:12,539
really exciting and so the great thing

1028
00:42:16,609 --> 00:42:14,390
about it is that we get an immediate

1029
00:42:19,640 --> 00:42:16,619
calibration point of the depth of the

1030
00:42:22,010 --> 00:42:19,650
soil so as we drive away with the

1031
00:42:24,650 --> 00:42:22,020
interpretation of the data will always

1032
00:42:28,700 --> 00:42:24,660
involve interpreting a multi-layer

1033
00:42:30,710 --> 00:42:28,710
system and and so we already have a hard

1034
00:42:33,740 --> 00:42:30,720
data point on the depth to the hard rock

1035
00:42:36,109 --> 00:42:33,750
and if we choose to use our signs other

1036
00:42:37,970 --> 00:42:36,119
science instruments there to see what's

1037
00:42:40,220 --> 00:42:37,980
what's in there we get compositional

1038
00:42:44,359 --> 00:42:40,230

information as well so that's just one

1039
00:42:46,400 --> 00:42:44,369
example of how this really diverse

1040
00:42:47,630 --> 00:42:46,410
payload can be used to figure out

1041
00:42:49,609 --> 00:42:47,640
problems that have not been addressed

1042
00:42:52,040 --> 00:42:49,619
before and there's the ton of others out

1043
00:42:54,510 --> 00:42:52,050
there as well we can see

1044
00:42:56,160 --> 00:42:54,520
okay we're going to take the phone line

1045
00:42:59,010 --> 00:42:56,170
next it's irene klotz from Reuters

1046
00:43:01,820 --> 00:42:59,020
please go ahead thanks very much vodka

1047
00:43:05,520 --> 00:43:01,830
and it's my questions for John

1048
00:43:08,099 --> 00:43:05,530
grotzinger on the stress by your

1049
00:43:10,800 --> 00:43:08,109
description of this view of early view

1050
00:43:12,870 --> 00:43:10,810
of Gale Crater as bearing some

1051
00:43:15,180 --> 00:43:12,880
resemblance to of you from the Hobby

1052
00:43:19,380 --> 00:43:15,190
desert and was wondering if you might

1053
00:43:21,960 --> 00:43:19,390
give us a little geology class here and

1054
00:43:27,390 --> 00:43:21,970
talk about what kind of conditions on

1055
00:43:30,420 --> 00:43:27,400
earth produce this sort of landscape um

1056
00:43:33,390 --> 00:43:30,430
that would that would take a long time I

1057
00:43:35,130 --> 00:43:33,400
think you know the short the short

1058
00:43:38,849 --> 00:43:35,140
version of it is let me let me try to

1059
00:43:43,410 --> 00:43:38,859
paint the picture this way when you know

1060
00:43:45,900 --> 00:43:43,420
I my first experience with Mars was was

1061
00:43:48,839 --> 00:43:45,910
when spirit opportunity landed and I

1062
00:43:50,760 --> 00:43:48,849
think when spirit landed a lot of the

1063
00:43:52,530 --> 00:43:50,770

folks that have worked on previous Mars

1064
00:43:53,820 --> 00:43:52,540
missions had had a feeling that you know

1065
00:43:56,010 --> 00:43:53,830
this was a lot like Viking and

1066
00:43:57,810 --> 00:43:56,020
Pathfinder and but when opportunity

1067
00:44:01,950 --> 00:43:57,820
landed it looked completely different

1068
00:44:03,570 --> 00:44:01,960
and and those of us novices wondered at

1069
00:44:06,150 --> 00:44:03,580
the time you know gosh is you know as

1070
00:44:07,290 --> 00:44:06,160
nASA making up this data because there's

1071
00:44:09,810 --> 00:44:07,300
nothing that looks particularly

1072
00:44:12,359 --> 00:44:09,820
extraordinary about this until we saw

1073
00:44:14,190 --> 00:44:12,369
all of these blueberries and and then

1074
00:44:15,390 --> 00:44:14,200
you looked at it you saw the context for

1075
00:44:19,349 --> 00:44:15,400
that you thought nobody could make that

1076
00:44:21,630 --> 00:44:19,359
up it's just it's just so weird and now

1077
00:44:25,320 --> 00:44:21,640
this time with curiosity we land in

1078
00:44:27,329 --> 00:44:25,330
something that actually looks very mars

1079
00:44:28,620 --> 00:44:27,339
like but it also looks earth-like with

1080
00:44:31,140 --> 00:44:28,630
those those mountains in the background

1081
00:44:33,720 --> 00:44:31,150
there these deeply dissected pyramidal

1082
00:44:35,099 --> 00:44:33,730
mountain ranges and it just looks a lot

1083
00:44:37,589 --> 00:44:35,109
like what you see out in the Mojave

1084
00:44:39,599 --> 00:44:37,599
Desert it's really cool and so it kind

1085
00:44:42,570 --> 00:44:39,609
of makes you feel at home and without

1086
00:44:46,050 --> 00:44:42,580
the geology lesson I I think that the

1087
00:44:47,370 --> 00:44:46,060
the great experience there is as we're

1088
00:44:49,170 --> 00:44:47,380

looking at a place that feels really

1089
00:44:50,849 --> 00:44:49,180
comfortable and what's going to be

1090
00:44:54,760 --> 00:44:50,859
interesting is going to be to find out

1091
00:44:58,630 --> 00:44:56,440
okay we've got one here at the front of

1092
00:45:01,000 --> 00:44:58,640
the room and then i will go again to the

1093
00:45:03,790 --> 00:45:01,010
phone lines coming to you right there

1094
00:45:06,940 --> 00:45:03,800
there you go kelly BTW sky and telescope

1095
00:45:09,430 --> 00:45:06,950
thanks to high rise and Marty I think we

1096
00:45:12,070 --> 00:45:09,440
now know the landing site location to

1097
00:45:15,310 --> 00:45:12,080
eight or 10 decimal places can we please

1098
00:45:17,260 --> 00:45:15,320
get Jennifer the time of the landing to

1099
00:45:20,770 --> 00:45:17,270
two decimal places at some point and

1100
00:45:23,770 --> 00:45:20,780
maybe other entry events as possible yes

1101
00:45:27,490 --> 00:45:23,780
in fact I think I have the time on my

1102
00:45:29,800 --> 00:45:27,500
phone here and I can look it up but and

1103
00:45:31,060 --> 00:45:29,810
then we can tag up after and you can

1104
00:45:33,130 --> 00:45:31,070
tell me what other times you want but

1105
00:45:34,690 --> 00:45:33,140
you can go to another question next

1106
00:45:35,980 --> 00:45:34,700
question and when you have it will come

1107
00:45:37,180 --> 00:45:35,990
back and answer that one so next

1108
00:45:40,780 --> 00:45:37,190
actually we're going to mike wall

1109
00:45:43,030 --> 00:45:40,790
space.com on the line go ahead oh yeah

1110
00:45:45,070 --> 00:45:43,040
this is for John and yeah I mean I've

1111
00:45:47,530 --> 00:45:45,080
asked you this before it's so yeah now

1112
00:45:49,090 --> 00:45:47,540
that we know kind of where the the

1113
00:45:50,410 --> 00:45:49,100

ballast came down where those craters

1114
00:45:53,050 --> 00:45:50,420
are is it really safe to say that

1115
00:45:55,960 --> 00:45:53,060
they're far too far away for curiosity

1116
00:45:58,210 --> 00:45:55,970
to to like to go and check out those new

1117
00:46:02,950 --> 00:45:58,220
fresh impact craters is that just not

1118
00:46:07,570 --> 00:46:02,960
possible it's like typically yeah I I

1119
00:46:09,160 --> 00:46:07,580
think you know the I think a lot of us

1120
00:46:10,840 --> 00:46:09,170
hoped that those things would come down

1121
00:46:13,090 --> 00:46:10,850
really close to where we landed because

1122
00:46:15,130 --> 00:46:13,100
they as tungsten there it's fairly inert

1123
00:46:16,720 --> 00:46:15,140
and it makes a fresh impact crater that

1124
00:46:18,610 --> 00:46:16,730
you could look in so there'd be a lot is

1125
00:46:22,120 --> 00:46:18,620
our to do that these things are really

1126
00:46:24,280 --> 00:46:22,130
far away there there's sort of as the

1127
00:46:27,850 --> 00:46:24,290
crow flies they're not that far away but

1128
00:46:29,920 --> 00:46:27,860
our obstacle is this dune field that we

1129
00:46:32,740 --> 00:46:29,930
have no desire to drive across unless we

1130
00:46:35,080 --> 00:46:32,750
have to and and other than that they

1131
00:46:39,730 --> 00:46:35,090
they look like they've landed in a part

1132
00:46:43,000 --> 00:46:39,740
of of the mountain there that has mass

1133
00:46:46,300 --> 00:46:43,010
flows that will that will be interesting

1134
00:46:48,640 --> 00:46:46,310
in their own right but they obscure the

1135
00:46:50,260 --> 00:46:48,650
stratigraphy that we're after in terms

1136
00:46:52,510 --> 00:46:50,270
of the target that we want to go to so

1137
00:46:55,270 --> 00:46:52,520
we would have to do an enormous you turn

1138
00:46:56,800 --> 00:46:55,280

around the dune field and I just don't

1139
00:47:00,400 --> 00:46:56,810
think it's going to be practical to do

1140
00:47:03,240 --> 00:47:00,410
that okay let me get someone who has not

1141
00:47:05,290 --> 00:47:03,250
yet asked a question go ahead over here

1142
00:47:06,560 --> 00:47:05,300
thank you very much i'm fernando

1143
00:47:08,750 --> 00:47:06,570
guerrero

1144
00:47:11,270 --> 00:47:08,760
there's a million in Mexico in my

1145
00:47:13,970 --> 00:47:11,280
country I'm astronomer and studied space

1146
00:47:15,770 --> 00:47:13,980
weather and presenting TV to costcos

1147
00:47:19,010 --> 00:47:15,780
congratulation for the space weather

1148
00:47:22,160 --> 00:47:19,020
from Mars the question is in the Phoenix

1149
00:47:24,560 --> 00:47:22,170
mission NASA develops a software to

1150
00:47:27,470 --> 00:47:24,570
watch display the meteorological

1151
00:47:30,950 --> 00:47:27,480
conditions in my computer will be

1152
00:47:33,050 --> 00:47:30,960
something like that with curiosity well

1153
00:47:36,050 --> 00:47:33,060
the Rams experiment will provide weather

1154
00:47:39,590 --> 00:47:36,060
as in winds and temperatures and

1155
00:47:41,180 --> 00:47:39,600
pressures as well as UV radiation we

1156
00:47:43,250 --> 00:47:41,190
will also be measuring the space weather

1157
00:47:46,820 --> 00:47:43,260
from the surface in terms of energetic

1158
00:47:49,430 --> 00:47:46,830
particle space weather and those will be

1159
00:47:52,520 --> 00:47:49,440
available I believe both rims and rad we

1160
00:47:54,920 --> 00:47:52,530
do have plans to abroad get week we only

1161
00:47:56,810 --> 00:47:54,930
get the data down once a day so we won't

1162
00:47:59,990 --> 00:47:56,820
be real time but you know there is par

1163
00:48:01,640 --> 00:48:00,000

plans to to provide these you know in as

1164
00:48:05,000 --> 00:48:01,650
close to real time as we can at least

1165
00:48:06,860 --> 00:48:05,010
certain summary data products thank you

1166
00:48:10,490 --> 00:48:06,870
very much congratulations again thank

1167
00:48:13,310 --> 00:48:10,500
you okay uh I'm gonna start with some

1168
00:48:15,440 --> 00:48:13,320
who have not yet asked back here and

1169
00:48:16,790 --> 00:48:15,450
then we'll make our way back hi Mark

1170
00:48:19,640 --> 00:48:16,800
Hall under the Washington Post in

1171
00:48:22,220 --> 00:48:19,650
National Geographic for Mike Malin you

1172
00:48:24,950 --> 00:48:22,230
had made some references to color that

1173
00:48:26,450 --> 00:48:24,960
may or may not be there in in the image

1174
00:48:30,310 --> 00:48:26,460
could you walk us through that a little

1175
00:48:34,840 --> 00:48:30,320
bit more in terms of what color might be

1176
00:48:38,030 --> 00:48:34,850
actually observable and and able to be

1177
00:48:39,920 --> 00:48:38,040
photographed and or the extent to which

1178
00:48:42,380 --> 00:48:39,930
Mars is the color that we're seeing

1179
00:48:44,870 --> 00:48:42,390
right there okay this this image has

1180
00:48:47,030 --> 00:48:44,880
been processed just to make make it

1181
00:48:49,280 --> 00:48:47,040
bright enough where you can see you can

1182
00:48:51,920 --> 00:48:49,290
see but that bright streak was like

1183
00:48:54,140 --> 00:48:51,930
eight times brighter than the shadow

1184
00:48:56,630 --> 00:48:54,150
around it and what you were getting was

1185
00:48:59,660 --> 00:48:56,640
leakage of that light smearing of that

1186
00:49:01,700 --> 00:48:59,670
light into that that dark area it's very

1187
00:49:04,760 --> 00:49:01,710
difficult to do what's known as

1188
00:49:08,480 --> 00:49:04,770

photometry in a shadowed area like that

1189
00:49:10,310 --> 00:49:08,490
so I think any color information that I

1190
00:49:14,150 --> 00:49:10,320
was seeing in there would be suspect

1191
00:49:15,950 --> 00:49:14,160
this image is was sufficiently processed

1192
00:49:18,110 --> 00:49:15,960
that I would not contend this is what

1193
00:49:19,610 --> 00:49:18,120
Mars looks like i was most i personally

1194
00:49:21,770 --> 00:49:19,620
more interest in the in the

1195
00:49:25,100 --> 00:49:21,780
than the the background fine materials

1196
00:49:26,600 --> 00:49:25,110
so I was interested in just showing you

1197
00:49:29,510 --> 00:49:26,610
the morphology of what the surface

1198
00:49:33,190 --> 00:49:29,520
looked like this camera does have the

1199
00:49:36,110 --> 00:49:33,200
bear color filter on it that's the same

1200
00:49:38,360 --> 00:49:36,120
way it makes color the same way your

1201
00:49:41,120 --> 00:49:38,370
cell phone camera make color or your

1202
00:49:43,210 --> 00:49:41,130
camcorder makes color you have a black

1203
00:49:47,320 --> 00:49:43,220
and white detector on which you put a

1204
00:49:50,960 --> 00:49:47,330
filter that that has red green and blue

1205
00:49:54,200 --> 00:49:50,970
patches on it that exactly match up with

1206
00:49:56,660 --> 00:49:54,210
the pixels of your camera and then you

1207
00:49:59,180 --> 00:49:56,670
use some interpolation techniques to to

1208
00:50:02,870 --> 00:49:59,190
average all those pixels together to

1209
00:50:04,820 --> 00:50:02,880
make a red green and blue picture that's

1210
00:50:07,790 --> 00:50:04,830
been done to this it was done to this

1211
00:50:10,160 --> 00:50:07,800
image on the spacecraft so our camera

1212
00:50:12,560 --> 00:50:10,170
actually did that interpolation and then

1213
00:50:15,080 --> 00:50:12,570

did the JPEG compression JPEG

1214
00:50:16,970 --> 00:50:15,090
compression almost always works in not

1215
00:50:19,400 --> 00:50:16,980
in red green blue space but in a

1216
00:50:24,550 --> 00:50:19,410
completely different mathematical color

1217
00:50:28,610 --> 00:50:24,560
space which is a YC RCB which is an old

1218
00:50:31,010 --> 00:50:28,620
ntsc television colors code that's when

1219
00:50:32,810 --> 00:50:31,020
jpg was developed and use that so it's

1220
00:50:35,420 --> 00:50:32,820
very difficult for me to give you a

1221
00:50:38,810 --> 00:50:35,430
specific answer and say that color is

1222
00:50:40,700 --> 00:50:38,820
right that color is wrong however on the

1223
00:50:42,110 --> 00:50:40,710
other cameras where we have calibration

1224
00:50:43,880 --> 00:50:42,120
targets will take images of the

1225
00:50:46,280 --> 00:50:43,890
calibration targets then we'll take

1226
00:50:48,200 --> 00:50:46,290
images of Mars and from that we can say

1227
00:50:50,240 --> 00:50:48,210
well the calibration target we know what

1228
00:50:52,250 --> 00:50:50,250
those colors were and we know under the

1229
00:50:54,410 --> 00:50:52,260
same illumination here we're seeing the

1230
00:50:57,380 --> 00:50:54,420
surface of Mars this is the information

1231
00:51:00,410 --> 00:50:57,390
we're getting so the the mastcam in

1232
00:51:03,050 --> 00:51:00,420
particular has multiple science filters

1233
00:51:05,570 --> 00:51:03,060
as well as the bear pattern filter and

1234
00:51:09,370 --> 00:51:05,580
that will be how we derive our color

1235
00:51:12,080 --> 00:51:09,380
information this is not real good cause

1236
00:51:14,150 --> 00:51:12,090
okay let's go first to Jennifer you have

1237
00:51:16,370 --> 00:51:14,160
the answer for the question about the

1238
00:51:17,990 --> 00:51:16,380

touchdown time yes we actually have

1239
00:51:20,330 --> 00:51:18,000
directly from the flight software a

1240
00:51:27,110 --> 00:51:20,340
message that is sent to us from the

1241
00:51:29,450 --> 00:51:27,120
vehicle 2012 day of year 219 to5 1757

1242
00:51:31,610 --> 00:51:29,460
which is the UTC time which is about 10

1243
00:51:34,490 --> 00:51:31,620
17 p.m.

1244
00:51:37,070 --> 00:51:34,500
pacific time PDT and you'll remember we

1245
00:51:39,140 --> 00:51:37,080
didn't get the signal until 10 32 or so

1246
00:51:41,480 --> 00:51:39,150
because of the one-way light time to

1247
00:51:44,180 --> 00:51:41,490
Mars right now Justin and I were also

1248
00:51:46,640 --> 00:51:44,190
talking we can get you the the actual

1249
00:51:48,230 --> 00:51:46,650
time of that first has cam image which

1250
00:51:53,360 --> 00:51:48,240
was taken between one and two minutes

1251
00:52:02,570 --> 00:51:53,370
after that and yes um just the time

1252
00:52:03,860 --> 00:52:02,580
again day of year to 1905 1757 UTC okay

1253
00:52:08,120 --> 00:52:03,870
another question here in the room at the

1254
00:52:10,580 --> 00:52:08,130
back right there Thanks hi he demos

1255
00:52:14,180 --> 00:52:10,590
photo from NHK DB Japan this is a

1256
00:52:16,790 --> 00:52:14,190
question from photon Hassler what is the

1257
00:52:19,400 --> 00:52:16,800
average level of radiation during the

1258
00:52:22,250 --> 00:52:19,410
eight and half month crews from hasta

1259
00:52:24,890 --> 00:52:22,260
Mars and the what the what are the

1260
00:52:28,600 --> 00:52:24,900
implication of those data set for the

1261
00:52:30,440 --> 00:52:28,610
future prospective manned flight to Mars

1262
00:52:32,120 --> 00:52:30,450
well we're still folding in the

1263
00:52:33,830 --> 00:52:32,130

contributions from both the neutral

1264
00:52:35,090 --> 00:52:33,840
particle measurements and the charged

1265
00:52:38,510 --> 00:52:35,100
particles and separating out the

1266
00:52:40,100 --> 00:52:38,520
background from the RTG but from the

1267
00:52:45,610 --> 00:52:40,110
seven from the just a little over seven

1268
00:52:49,190 --> 00:52:45,620
months of of cruise data we get a

1269
00:52:52,730 --> 00:52:49,200
fraction a few tenths of a sievert of

1270
00:52:55,940 --> 00:52:52,740
dose equivalent which is you know it's a

1271
00:52:57,650 --> 00:52:55,950
if you if you assume an astronaut career

1272
00:53:00,290 --> 00:52:57,660
doses on the order of a sievert that's

1273
00:53:02,390 --> 00:53:00,300
you know that's a few tenths of of that

1274
00:53:08,150 --> 00:53:02,400
so it's a it's a significant

1275
00:53:10,340 --> 00:53:08,160
contribution okay I think we have time

1276
00:53:14,270 --> 00:53:10,350
for one more question I will take alicia

1277
00:53:16,100 --> 00:53:14,280
chang question for John um I was

1278
00:53:18,620 --> 00:53:16,110
wondering if the robotic arm can reach

1279
00:53:20,210 --> 00:53:18,630
out to touch ask our marks and you know

1280
00:53:21,980 --> 00:53:20,220
now that you've gotten a good look at

1281
00:53:23,840 --> 00:53:21,990
the surroundings whether there are any

1282
00:53:26,450 --> 00:53:23,850
thoughts to stay in place initially or

1283
00:53:30,050 --> 00:53:26,460
take a short drive after the health

1284
00:53:32,450 --> 00:53:30,060
check-up it was the first part how far

1285
00:53:38,599 --> 00:53:32,460
is the arm reach out

1286
00:53:41,210 --> 00:53:38,609
uh don't know don't know yeah yeah it's

1287
00:53:43,849 --> 00:53:41,220
a Justin's estimation is it's probably

1288
00:53:47,120 --> 00:53:43,859

twice as far as we need so that we'd

1289
00:53:55,490 --> 00:53:47,130
have to move and then the second part

1290
00:53:57,380 --> 00:53:55,500
was could we move if we wanted to for

1291
00:53:59,030 --> 00:53:57,390
the initial science plan whether the

1292
00:54:01,700 --> 00:53:59,040
plan is to stay in place offers to

1293
00:54:04,220 --> 00:54:01,710
sample the region around or to take a

1294
00:54:07,130 --> 00:54:04,230
short drive it's it's wide open right

1295
00:54:11,030 --> 00:54:07,140
now the the commissioning activity

1296
00:54:13,579 --> 00:54:11,040
period that Jennifer is leading allows

1297
00:54:17,810 --> 00:54:13,589
us the capability and what we call

1298
00:54:20,240 --> 00:54:17,820
intermission to to drive if we want to

1299
00:54:23,329 --> 00:54:20,250
and so certainly it would be an option

1300
00:54:25,430 --> 00:54:23,339
to bump two meters forward so that we

1301
00:54:26,900 --> 00:54:25,440
could drop the arm down there if that if

1302
00:54:30,980 --> 00:54:26,910
that's what the science team wanted to

1303
00:54:32,930 --> 00:54:30,990
do or any other option if we decide we

1304
00:54:34,190 --> 00:54:32,940
want to drive you know if we decide we

1305
00:54:36,440 --> 00:54:34,200
do want to drive out of the area of

1306
00:54:38,900 --> 00:54:36,450
contamination where contamination means

1307
00:54:41,329 --> 00:54:38,910
when disturbance and see pristine

1308
00:54:43,280 --> 00:54:41,339
materials or if we want to go further

1309
00:54:46,160 --> 00:54:43,290
beyond that maybe go several tens of

1310
00:54:48,650 --> 00:54:46,170
meters you know all this is open right

1311
00:54:50,599 --> 00:54:48,660
now so we just you know the great thing

1312
00:54:52,190 --> 00:54:50,609
about it is is that with the spacecraft

1313
00:54:54,440 --> 00:54:52,200

being as healthy as it is and the

1314
00:55:00,589 --> 00:54:54,450
capability that it has all our options

1315
00:55:02,660 --> 00:55:00,599
are open for science alright we invite

1316
00:55:05,000 --> 00:55:02,670
you to join us again tomorrow at ten

1317
00:55:06,349 --> 00:55:05,010
a.m. pacific time again for another Mars

1318
00:55:08,780 --> 00:55:06,359
report from the Jet Propulsion

1319
00:56:23,640 --> 00:55:08,790
Laboratory in Pasadena California thank