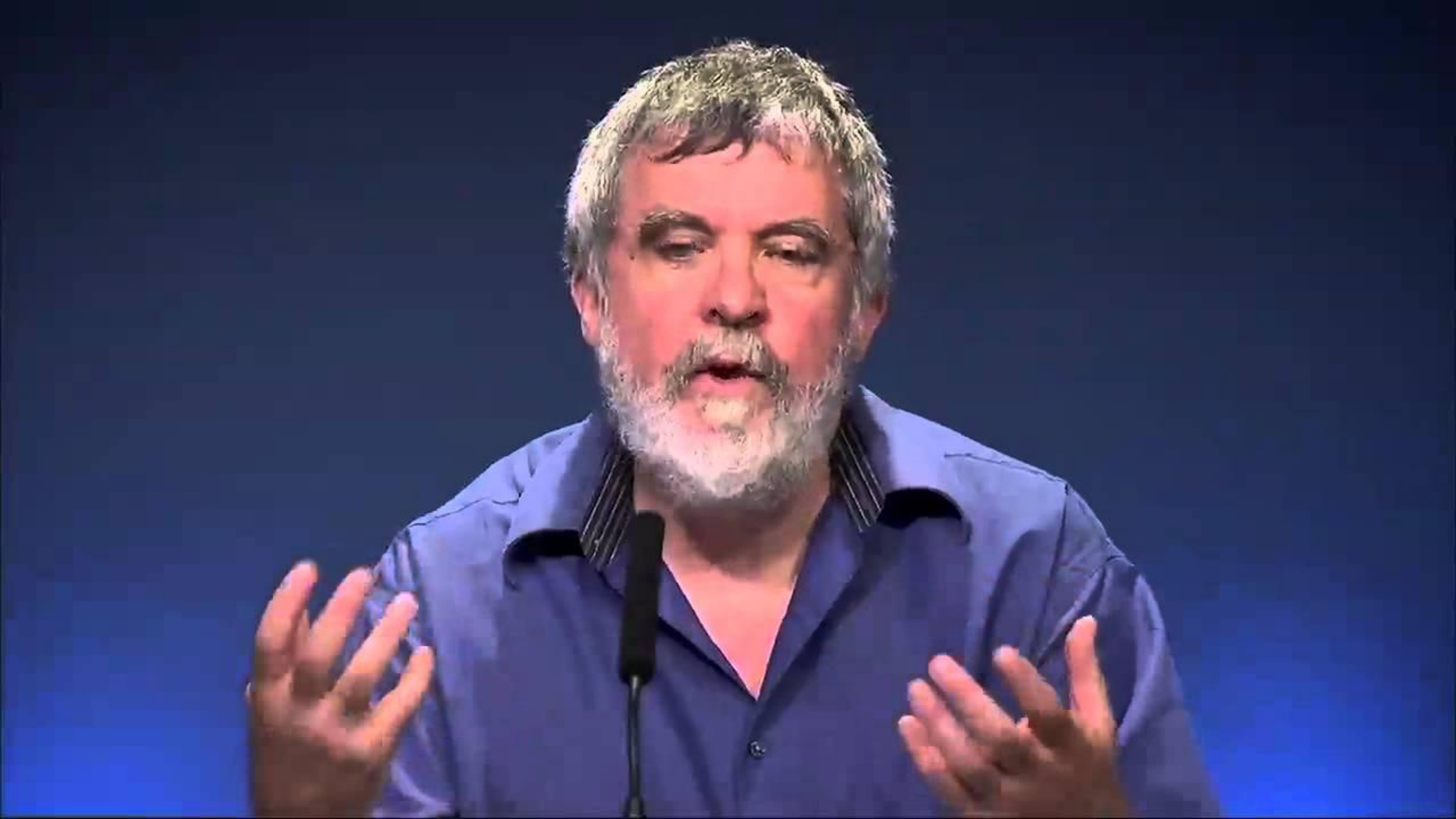

1
00:00:10,230 --> 00:00:07,829
good afternoon and welcome to nasa's jet

2
00:00:12,629 --> 00:00:10,240
propulsion laboratory we've got a lot to

3
00:00:15,190 --> 00:00:12,639
cover today about the mars curiosity

4
00:00:17,109 --> 00:00:15,200
rover including some new images and a

5
00:00:19,109 --> 00:00:17,119
special message first i'd like to

6
00:00:21,269 --> 00:00:19,119
introduce our panelists

7
00:00:23,269 --> 00:00:21,279
we're going to hear from dave lavery the

8
00:00:24,470 --> 00:00:23,279
program executive from mars science

9
00:00:27,509 --> 00:00:24,480
laboratory and he's from nasa

10
00:00:29,830 --> 00:00:27,519
headquarters in washington

11
00:00:31,990 --> 00:00:29,840
mike malen is the principal investigator

12
00:00:34,229 --> 00:00:32,000
of the mass camera or mass cam on

13
00:00:37,590 --> 00:00:34,239

curiosity with male and space science

14
00:00:39,750 --> 00:00:37,600
systems in san diego

15
00:00:41,510 --> 00:00:39,760
john grotzinger mars science laboratory

16
00:00:45,750 --> 00:00:41,520
project scientist with the california

17
00:00:47,590 --> 00:00:45,760
institute of technology in pasadena

18
00:00:50,150 --> 00:00:47,600
paul mahaffey is the principal

19
00:00:53,029 --> 00:00:50,160
investigator of the sample analysis at

20
00:00:54,709 --> 00:00:53,039
mars or sam instrument with goddard

21
00:00:56,950 --> 00:00:54,719
space flight center in greenbelt

22
00:00:59,709 --> 00:00:56,960
maryland

23
00:01:02,150 --> 00:00:59,719
and we have chad edwards of jpl chief

24
00:01:05,030 --> 00:01:02,160
telecommunications engineer for nasa's

25
00:01:06,390 --> 00:01:05,040
mars exploration program

26
00:01:09,190 --> 00:01:06,400
we're going to start things off with

27
00:01:12,469 --> 00:01:09,200
dave lavery

28
00:01:13,830 --> 00:01:12,479
good afternoon we've got a special uh

29
00:01:15,830 --> 00:01:13,840
piece of information to talk with you

30
00:01:17,510 --> 00:01:15,840
about today everyone's very familiar so

31
00:01:19,190 --> 00:01:17,520
far with the the photos the data the

32
00:01:21,830 --> 00:01:19,200
spectra that have been returned from the

33
00:01:24,149 --> 00:01:21,840
curiosity rover we actually have a new

34
00:01:26,550 --> 00:01:24,159
data type that we're going to let you

35
00:01:27,429 --> 00:01:26,560
hear about today that's a unique first

36
00:01:35,030 --> 00:01:27,439
of

37
00:01:37,190 --> 00:01:35,040
when we talk about the first one today

38
00:01:38,870 --> 00:01:37,200

this is a message from the nasa

39
00:01:40,469 --> 00:01:38,880
administrator that you're going to hear

40
00:01:42,469 --> 00:01:40,479
that was actually sent from the rover

41
00:01:43,749 --> 00:01:42,479
from the surface of the planet

42
00:01:45,510 --> 00:01:43,759
it fulfills a couple of different

43
00:01:46,789 --> 00:01:45,520
purposes this is an appropriate first

44
00:01:48,469 --> 00:01:46,799
off an appropriate thank you and

45
00:01:50,469 --> 00:01:48,479
recognition from the administrator to

46
00:01:51,830 --> 00:01:50,479
the team that put curiosity on the

47
00:01:53,510 --> 00:01:51,840
surface

48
00:01:55,590 --> 00:01:53,520
in addition it also fulfilled a purpose

49
00:01:57,429 --> 00:01:55,600
in helping us exercise some of the new

50
00:01:58,950 --> 00:01:57,439
adaptive communications capabilities

51
00:02:00,550 --> 00:01:58,960
that curiosity has in terms of

52
00:02:01,990 --> 00:02:00,560
transmitting information back from the

53
00:02:03,350 --> 00:02:02,000
plan and getting information to the

54
00:02:04,709 --> 00:02:03,360
planet you're going to hear some more

55
00:02:06,230 --> 00:02:04,719
about that from chad in just a few

56
00:02:08,949 --> 00:02:06,240
minutes

57
00:02:11,510 --> 00:02:08,959
but perhaps most of all it was actually

58
00:02:13,990 --> 00:02:11,520
a an opportunity to understand that we

59
00:02:15,510 --> 00:02:14,000
could have a voice a human voice sent

60
00:02:18,470 --> 00:02:15,520
back from the surface of another planet

61
00:02:20,070 --> 00:02:18,480
for the very first time in history

62
00:02:21,670 --> 00:02:20,080
with this we have another small step

63
00:02:24,630 --> 00:02:21,680

that's being taken and extending the

64
00:02:26,229 --> 00:02:24,640
human presence beyond earth and actually

65
00:02:28,070 --> 00:02:26,239
experience bring that experience of

66
00:02:29,430 --> 00:02:28,080
exploring the planets back a little bit

67
00:02:31,270 --> 00:02:29,440
closer to all of us and actually

68
00:02:33,430 --> 00:02:31,280
extending that human touch

69
00:02:35,110 --> 00:02:33,440
as curiosity continues our mission we

70
00:02:36,869 --> 00:02:35,120
hope that the words of the administrator

71
00:02:39,030 --> 00:02:36,879
will be an inspiration to someone who is

72
00:02:40,630 --> 00:02:39,040
alive today who will become the first to

73
00:02:41,589 --> 00:02:40,640
stand upon the surface of the planet

74
00:02:43,750 --> 00:02:41,599
mars

75
00:02:45,589 --> 00:02:43,760
like the great neil armstrong they'll be

76
00:02:47,509 --> 00:02:45,599
able to speak aloud in first person at

77
00:02:49,509 --> 00:02:47,519
that point of the next giant leap in

78
00:02:55,030 --> 00:02:49,519
human exploration so if we could have

79
00:02:57,670 --> 00:02:55,990
hello

80
00:02:59,589 --> 00:02:57,680
this is charlie bolden nasa

81
00:03:01,910 --> 00:02:59,599
administrator speaking to you via the

82
00:03:04,550 --> 00:03:01,920
broadcast capabilities of the curiosity

83
00:03:05,910 --> 00:03:04,560
rover which is now on the surface of

84
00:03:08,149 --> 00:03:05,920
mars

85
00:03:11,110 --> 00:03:08,159
since the beginning of time humankind's

86
00:03:12,229 --> 00:03:11,120
curiosity has led us to constantly seek

87
00:03:14,149 --> 00:03:12,239
new life

88
00:03:15,589 --> 00:03:14,159

new possibilities just beyond the

89
00:03:17,589 --> 00:03:15,599
horizon

90
00:03:19,670 --> 00:03:17,599
i want to congratulate the men and women

91
00:03:21,750 --> 00:03:19,680
of our nasa family as well as our

92
00:03:24,390 --> 00:03:21,760
commercial and government partners

93
00:03:26,550 --> 00:03:24,400
around the world for taking us a step

94
00:03:29,030 --> 00:03:26,560
beyond to mars

95
00:03:31,750 --> 00:03:29,040
this is an extraordinary achievement

96
00:03:33,270 --> 00:03:31,760
landing a rover on mars is not easy

97
00:03:35,910 --> 00:03:33,280
others have tried

98
00:03:38,070 --> 00:03:35,920
only america has fully succeeded

99
00:03:39,670 --> 00:03:38,080
the investment we are making the

100
00:03:42,630 --> 00:03:39,680
knowledge we hope to gain from our

101
00:03:44,550 --> 00:03:42,640
observation and analysis of gale crater

102
00:03:47,430 --> 00:03:44,560
will tell us much about the possibility

103
00:03:50,949 --> 00:03:47,440
of life on mars as well as the past and

104
00:03:53,110 --> 00:03:50,959
future possibilities of our own planet

105
00:03:54,869 --> 00:03:53,120
curiosity will bring benefits to earth

106
00:03:57,030 --> 00:03:54,879
and inspire a new generation of

107
00:03:59,429 --> 00:03:57,040
scientists and explorers

108
00:04:02,550 --> 00:03:59,439
as it prepares the way for a human

109
00:04:07,270 --> 00:04:02,560
mission in the not too distant future

110
00:04:10,789 --> 00:04:08,789
and with that we have the first human

111
00:04:13,589 --> 00:04:10,799
voice from another planet

112
00:04:16,469 --> 00:04:13,599
mike thank you

113
00:04:19,509 --> 00:04:16,479

if i can have the video please

114
00:04:21,830 --> 00:04:19,519
this is uh going to be a

115
00:04:24,150 --> 00:04:21,840
pan through and zoom into

116
00:04:27,270 --> 00:04:24,160
the full resolution

117
00:04:29,189 --> 00:04:27,280
mastcam 34 the medium resolution camera

118
00:04:30,150 --> 00:04:29,199
view of mars

119
00:04:31,749 --> 00:04:30,160
this

120
00:04:33,670 --> 00:04:31,759
mosaic has been released a couple of

121
00:04:36,390 --> 00:04:33,680
times going through

122
00:04:38,790 --> 00:04:36,400
we filled on all the holes we've added

123
00:04:42,390 --> 00:04:38,800
mount sharp in the system in the in the

124
00:04:44,790 --> 00:04:42,400
sequence this is basically 140

125
00:04:48,230 --> 00:04:44,800
m34 images

126
00:04:50,870 --> 00:04:48,240
the mosaic is about 29 000 pixels wide

127
00:04:53,909 --> 00:04:50,880
by 7000 pixels tall

128
00:04:56,550 --> 00:04:53,919
the colors in this are modified from the

129
00:04:58,469 --> 00:04:56,560
original as returned as returned it's a

130
00:05:00,629 --> 00:04:58,479
little more khaki looking

131
00:05:02,710 --> 00:05:00,639
we basically do processing to brighten

132
00:05:05,270 --> 00:05:02,720
up the scene and to adjust some of the

133
00:05:06,710 --> 00:05:05,280
colors as you can see the layering in

134
00:05:08,469 --> 00:05:06,720
mount sharp

135
00:05:09,430 --> 00:05:08,479
john's going to talk about that in a few

136
00:05:11,990 --> 00:05:09,440
minutes

137
00:05:14,469 --> 00:05:12,000
the uh this pan is going to end at a

138
00:05:17,110 --> 00:05:14,479

location where i'll pick up with some

139
00:05:20,070 --> 00:05:17,120
stills in a minute uh basically this

140
00:05:22,390 --> 00:05:20,080
mosaic was out of focus we didn't have

141
00:05:24,790 --> 00:05:22,400
the character the focus positions

142
00:05:26,870 --> 00:05:24,800
characterized well enough when we landed

143
00:05:29,749 --> 00:05:26,880
to ensure that the images would be in

144
00:05:32,390 --> 00:05:29,759
focus when we took this sequence

145
00:05:34,870 --> 00:05:32,400
we've been in the midst of a

146
00:05:38,950 --> 00:05:34,880
characterization phase for the last week

147
00:05:40,550 --> 00:05:38,960
or so gotten several hundred images

148
00:05:42,390 --> 00:05:40,560
and these images are going to be

149
00:05:46,150 --> 00:05:42,400
returned to the earth over a longer

150
00:05:48,070 --> 00:05:46,160
period of time in a in a raw form

151
00:05:50,150 --> 00:05:48,080
that allows us to do a bunch of tests

152
00:05:51,110 --> 00:05:50,160
with them once we get them back on the

153
00:05:53,430 --> 00:05:51,120
ground

154
00:05:55,430 --> 00:05:53,440
if i can have the first slide

155
00:05:57,590 --> 00:05:55,440
this is basically the same area you were

156
00:05:59,670 --> 00:05:57,600
looking at in the last

157
00:06:01,510 --> 00:05:59,680
portion of the video

158
00:06:03,510 --> 00:06:01,520
just a word about the colors this has

159
00:06:05,189 --> 00:06:03,520
been white balanced

160
00:06:07,590 --> 00:06:05,199
but with a little less blue than

161
00:06:09,590 --> 00:06:07,600
normally comes in with white balance i

162
00:06:11,510 --> 00:06:09,600
do this because it looks pretty to me

163
00:06:13,909 --> 00:06:11,520

and it's also a geologically

164
00:06:15,749 --> 00:06:13,919
interpretable image since my experiences

165
00:06:18,230 --> 00:06:15,759
on the earth i like to look at things as

166
00:06:20,150 --> 00:06:18,240
they would look like on the earth and on

167
00:06:22,390 --> 00:06:20,160
mars it's as i said a little more khaki

168
00:06:24,870 --> 00:06:22,400
color a little bit also a little pink on

169
00:06:26,309 --> 00:06:24,880
top of that in the foreground you see

170
00:06:29,110 --> 00:06:26,319
the the

171
00:06:31,110 --> 00:06:29,120
gravel lag that the rover is sitting on

172
00:06:34,070 --> 00:06:31,120
between us and that uh

173
00:06:35,909 --> 00:06:34,080
middle section which is a a rim of an

174
00:06:38,150 --> 00:06:35,919
impact crater uh there's actually a

175
00:06:40,390 --> 00:06:38,160
little depression between us and as

176
00:06:42,950 --> 00:06:40,400
you'll see in a few slides further on

177
00:06:45,029 --> 00:06:42,960
i've got some of the distances labeled

178
00:06:47,350 --> 00:06:45,039
and then farther out you see

179
00:06:50,390 --> 00:06:47,360
the darker sand dunes uh there's

180
00:06:53,670 --> 00:06:50,400
actually in that foreground view a

181
00:06:56,309 --> 00:06:53,680
sort of little orange brown ripple which

182
00:06:57,350 --> 00:06:56,319
is a sand of a different composition

183
00:06:59,670 --> 00:06:57,360
than the far

184
00:07:00,790 --> 00:06:59,680
middle sand in the in the in the darker

185
00:07:03,749 --> 00:07:00,800
area there

186
00:07:06,309 --> 00:07:03,759
the next slide shows a box that's just

187
00:07:08,790 --> 00:07:06,319
going to i'm going to bring up that area

188
00:07:09,589 --> 00:07:08,800

in the in the m100

189
00:07:12,150 --> 00:07:09,599
next

190
00:07:15,430 --> 00:07:12,160
slide shows the left side of this image

191
00:07:16,629 --> 00:07:15,440
is the m34 zoomed up by a factor of

192
00:07:19,749 --> 00:07:16,639
three

193
00:07:22,390 --> 00:07:19,759
difference in the resolutions of the two

194
00:07:26,150 --> 00:07:22,400
cameras on the right hand side is the

195
00:07:26,870 --> 00:07:26,160
m100 100 millimeter focal length camera

196
00:07:28,390 --> 00:07:26,880
and

197
00:07:30,309 --> 00:07:28,400
uh again at

198
00:07:31,749 --> 00:07:30,319
these types of scales where you're

199
00:07:34,550 --> 00:07:31,759
looking at sort of a

200
00:07:37,589 --> 00:07:34,560
an average down view as is is shown in

201
00:07:39,749 --> 00:07:37,599
television uh it's very hard to see the

202
00:07:41,350 --> 00:07:39,759
improvement in the resolution but

203
00:07:43,589 --> 00:07:41,360
towards the end i'll show you one thing

204
00:07:45,029 --> 00:07:43,599
where i think the the quality of what

205
00:07:46,390 --> 00:07:45,039
we're getting from the

206
00:07:47,430 --> 00:07:46,400
from the higher resolution camera will

207
00:07:48,869 --> 00:07:47,440
come through

208
00:07:51,510 --> 00:07:48,879
the next view

209
00:07:54,550 --> 00:07:51,520
shows that single uh high resolution

210
00:07:55,830 --> 00:07:54,560
this is actually two merged uh narrow

211
00:07:57,990 --> 00:07:55,840
angle or

212
00:08:00,390 --> 00:07:58,000
m-100 images

213
00:08:02,869 --> 00:08:00,400

and we took a whole sequence of these

214
00:08:05,270 --> 00:08:02,879
from looking basically from the rover's

215
00:08:07,670 --> 00:08:05,280
wheels all the way out to the horizon

216
00:08:09,990 --> 00:08:07,680
running through the entire focus range

217
00:08:12,790 --> 00:08:10,000
of the cameras and we've characterized

218
00:08:14,629 --> 00:08:12,800
in great detail now where the best focus

219
00:08:17,670 --> 00:08:14,639
at each distance is

220
00:08:18,550 --> 00:08:17,680
and and these are in much better focus

221
00:08:20,869 --> 00:08:18,560
and

222
00:08:22,390 --> 00:08:20,879
you'll see in a minute the the quality

223
00:08:24,790 --> 00:08:22,400
when you zoom it up

224
00:08:26,950 --> 00:08:24,800
next slide will show the distances so

225
00:08:29,909 --> 00:08:26,960
there's a gravel in the foreground out

226
00:08:32,469 --> 00:08:29,919
to about 125 meters then there's a

227
00:08:34,949 --> 00:08:32,479
little swale which is a depression from

228
00:08:36,550 --> 00:08:34,959
there out to the rim of an impact crater

229
00:08:38,550 --> 00:08:36,560
so there's a there's a depression

230
00:08:40,469 --> 00:08:38,560
between us and the rim of the impact

231
00:08:44,230 --> 00:08:40,479
crater and that's that depression goes

232
00:08:47,910 --> 00:08:44,240
from about 125 to 230 meters then those

233
00:08:49,110 --> 00:08:47,920
rocks are at 230 meters and they're

234
00:08:51,829 --> 00:08:49,120
about

235
00:08:53,829 --> 00:08:51,839
a meter across something like that

236
00:08:56,949 --> 00:08:53,839
you'll see a slightly lighter area just

237
00:08:59,269 --> 00:08:56,959
below the 3.7 off to the left that's the

238
00:09:01,269 --> 00:08:59,279

other rim of the of the crater that's

239
00:09:04,389 --> 00:09:01,279
the far rim of the crater that's only

240
00:09:07,829 --> 00:09:04,399
about another 20 meter 30 meters away

241
00:09:09,110 --> 00:09:07,839
between there and the 3.7 kilometers at

242
00:09:10,949 --> 00:09:09,120
the base

243
00:09:13,269 --> 00:09:10,959
of or in the middle of this image which

244
00:09:15,829 --> 00:09:13,279
is on the dune field the dark dune field

245
00:09:17,750 --> 00:09:15,839
there's a depression that that is found

246
00:09:21,030 --> 00:09:17,760
completely around

247
00:09:22,870 --> 00:09:21,040
mount sharp there's a moat a deeper area

248
00:09:24,949 --> 00:09:22,880
we don't actually start seeing it until

249
00:09:26,710 --> 00:09:24,959
it's about three kilometers away and

250
00:09:28,949 --> 00:09:26,720
then you can see mounds at this a

251
00:09:30,630 --> 00:09:28,959
variety of distances at the very top

252
00:09:33,670 --> 00:09:30,640
of this

253
00:09:35,030 --> 00:09:33,680
slide we're looking 16.2 kilometers away

254
00:09:36,790 --> 00:09:35,040
you're looking through some haze which

255
00:09:38,790 --> 00:09:36,800
is why it gets a little brighter as you

256
00:09:41,350 --> 00:09:38,800
go to the top of the image

257
00:09:43,670 --> 00:09:41,360
the next slide is going to be my last

258
00:09:45,350 --> 00:09:43,680
this is an enlargement of that last of

259
00:09:46,630 --> 00:09:45,360
that last slide

260
00:09:48,870 --> 00:09:46,640
and

261
00:09:51,910 --> 00:09:48,880
it's very geologically exciting to me

262
00:09:54,949 --> 00:09:53,750
it's probably a little bit more pastel

263
00:09:55,910 --> 00:09:54,959

and a little bit

264
00:09:58,389 --> 00:09:55,920
pinker

265
00:10:00,870 --> 00:09:58,399
than it would be to your eye

266
00:10:02,870 --> 00:10:00,880
but it's to me very geologically

267
00:10:04,389 --> 00:10:02,880
interpretable and there's a lot of neat

268
00:10:06,630 --> 00:10:04,399
stuff in there that i see

269
00:10:08,949 --> 00:10:06,640
so there's a you sort of see a from the

270
00:10:11,030 --> 00:10:08,959
middle right side of the image going up

271
00:10:13,509 --> 00:10:11,040
to the towards the top there's sort of a

272
00:10:16,310 --> 00:10:13,519
diagonal layer that's actually a layer

273
00:10:18,790 --> 00:10:16,320
of material that's draping over previous

274
00:10:20,949 --> 00:10:18,800
existing topography and that whole stuff

275
00:10:23,350 --> 00:10:20,959
was then buried and he and exhumed and

276
00:10:25,110 --> 00:10:23,360
eroded to give you what you see now last

277
00:10:27,269 --> 00:10:25,120
thing the last slide

278
00:10:29,910 --> 00:10:27,279
is for reference

279
00:10:32,870 --> 00:10:29,920
in the in the box of the main image

280
00:10:35,430 --> 00:10:32,880
which is about 30 meters across there's

281
00:10:38,069 --> 00:10:35,440
a little black dot that little black dot

282
00:10:39,829 --> 00:10:38,079
is a boulder the size of the rover and

283
00:10:41,829 --> 00:10:39,839
so i've enlarged it in the lower right

284
00:10:44,870 --> 00:10:41,839
there so you can see it but that gives

285
00:10:47,030 --> 00:10:44,880
you an idea of the scale of these hills

286
00:10:48,870 --> 00:10:47,040
and the canyons that we'll be driving on

287
00:10:50,949 --> 00:10:48,880
basically this is the ultimate goal this

288
00:10:52,870 --> 00:10:50,959

is where we want to get in the next year

289
00:10:55,350 --> 00:10:52,880
and a half or two years this is the

290
00:10:56,870 --> 00:10:55,360
place we want to be it's uh this is 10

291
00:10:58,630 --> 00:10:56,880
kilometers away

292
00:11:01,030 --> 00:10:58,640
and it would take the rover even with

293
00:11:02,790 --> 00:11:01,040
the rover driving flat out

294
00:11:04,150 --> 00:11:02,800
a hundred days to get there and we're

295
00:11:06,550 --> 00:11:04,160
not going to drive flat out because we

296
00:11:08,630 --> 00:11:06,560
have science to do as well so it's going

297
00:11:09,670 --> 00:11:08,640
to take us a while to get over there but

298
00:11:11,590 --> 00:11:09,680
basically

299
00:11:13,590 --> 00:11:11,600
when we're there if we had left the

300
00:11:15,269 --> 00:11:13,600
camera at the landing site we'd say see

301
00:11:16,949 --> 00:11:15,279
this and it looked you know maybe we'll

302
00:11:17,829 --> 00:11:16,959
get up to that boulder and we can

303
00:11:20,389 --> 00:11:17,839
actually

304
00:11:21,190 --> 00:11:20,399
see what it looks like john yeah thanks

305
00:11:23,110 --> 00:11:21,200
mike

306
00:11:25,829 --> 00:11:23,120
i i think henry if you could just put

307
00:11:27,670 --> 00:11:25,839
that one back up again i i think when

308
00:11:29,590 --> 00:11:27,680
those of us on the science team looked

309
00:11:30,949 --> 00:11:29,600
at that image for the first time you you

310
00:11:33,030 --> 00:11:30,959
get this feeling

311
00:11:33,829 --> 00:11:33,040
you know that's what i'm talking about

312
00:11:39,269 --> 00:11:33,839
that

313
00:11:41,430 --> 00:11:39,279

and although this the anticipated scenic

314
00:11:43,030 --> 00:11:41,440
beauty was not something that was

315
00:11:44,949 --> 00:11:43,040
at the top of the list for reasons to

316
00:11:46,389 --> 00:11:44,959
select it it was certainly one thing

317
00:11:47,910 --> 00:11:46,399
that we were hoping would come through

318
00:11:50,389 --> 00:11:47,920
one day so it's

319
00:11:51,430 --> 00:11:50,399
it's awesome to to see this

320
00:11:54,150 --> 00:11:51,440
and

321
00:11:56,230 --> 00:11:54,160
i think when you look down from orbit

322
00:11:58,150 --> 00:11:56,240
and and you get a sense for what you're

323
00:11:59,350 --> 00:11:58,160
looking at on the ground that you don't

324
00:12:01,110 --> 00:11:59,360
really know what it's going to look like

325
00:12:02,710 --> 00:12:01,120
until you're on the ground and then and

326
00:12:05,110 --> 00:12:02,720
then you see it

327
00:12:07,030 --> 00:12:05,120
the really amazing thing about this is

328
00:12:09,590 --> 00:12:07,040
all those layers that you're looking at

329
00:12:10,990 --> 00:12:09,600
are the layers from orbit that contain

330
00:12:13,750 --> 00:12:11,000
the hydrated

331
00:12:15,509 --> 00:12:13,760
phylosilicates and sulfates so

332
00:12:18,310 --> 00:12:15,519
everything in that image

333
00:12:21,110 --> 00:12:18,320
there is a science target for us

334
00:12:23,190 --> 00:12:21,120
and and again the the goal here is to

335
00:12:24,470 --> 00:12:23,200
drive up eventually and and mike's right

336
00:12:25,509 --> 00:12:24,480
it'll probably take us a year to get

337
00:12:26,710 --> 00:12:25,519
there but

338
00:12:28,870 --> 00:12:26,720

when we do

339
00:12:30,790 --> 00:12:28,880
there's a very systematic approach to

340
00:12:32,389 --> 00:12:30,800
exploring moving around through this

341
00:12:33,990 --> 00:12:32,399
terrain that looks like it it was

342
00:12:34,870 --> 00:12:34,000
something that comes out of a john ford

343
00:12:36,710 --> 00:12:34,880
movie

344
00:12:38,629 --> 00:12:36,720
uh you know we're going to be driving

345
00:12:40,470 --> 00:12:38,639
the rover around in these valleys and

346
00:12:43,030 --> 00:12:40,480
looking up at these hills and finding

347
00:12:45,110 --> 00:12:43,040
the places where the strata come down

348
00:12:47,750 --> 00:12:45,120
and intersect the topography

349
00:12:49,269 --> 00:12:47,760
that the rover can can drive through and

350
00:12:51,190 --> 00:12:49,279
we know it can because there's so much

351
00:12:53,910 --> 00:12:51,200
great data from orbit that allowed us to

352
00:12:55,350 --> 00:12:53,920
simulate the drives before we chose this

353
00:12:56,710 --> 00:12:55,360
landing site to demonstrate that we

354
00:12:58,470 --> 00:12:56,720
could make it up through through this

355
00:13:01,350 --> 00:12:58,480
terrain

356
00:13:03,030 --> 00:13:01,360
but as the images came down there was

357
00:13:05,190 --> 00:13:03,040
another feature that really caught our

358
00:13:06,470 --> 00:13:05,200
attention so if we can go to the head to

359
00:13:09,269 --> 00:13:06,480
the next one

360
00:13:11,990 --> 00:13:09,279
what what you see in this in this image

361
00:13:14,870 --> 00:13:12,000
in the mosaic that mike put together is

362
00:13:17,750 --> 00:13:14,880
there's a a train of white dots that we

363
00:13:21,030 --> 00:13:17,760

place there to indicate a transition

364
00:13:24,629 --> 00:13:21,040
from the strata that are almost flat

365
00:13:27,430 --> 00:13:24,639
lying not quite uh and they're full of

366
00:13:29,670 --> 00:13:27,440
the hydrated minerals to strata above

367
00:13:31,670 --> 00:13:29,680
them which do not obviously contain the

368
00:13:34,389 --> 00:13:31,680
hydrated minerals now we don't know from

369
00:13:35,990 --> 00:13:34,399
orbit whether they're absent those

370
00:13:37,590 --> 00:13:36,000
spectral responses because they're

371
00:13:40,150 --> 00:13:37,600
covered with dust

372
00:13:41,829 --> 00:13:40,160
or because they're truly absent but the

373
00:13:44,230 --> 00:13:41,839
striking thing about it is that

374
00:13:46,470 --> 00:13:44,240
everything above that line of white dots

375
00:13:48,870 --> 00:13:46,480
is steeply inclined with respect to

376
00:13:50,550 --> 00:13:48,880
everything that's below it they dip from

377
00:13:52,629 --> 00:13:50,560
left to right

378
00:13:55,269 --> 00:13:52,639
and and these are features that that

379
00:13:57,590 --> 00:13:55,279
geologists call cliniforms they they

380
00:13:58,629 --> 00:13:57,600
indicate that in the accretion of the

381
00:14:01,030 --> 00:13:58,639
strata

382
00:14:03,670 --> 00:14:01,040
that they built out progressively from

383
00:14:07,269 --> 00:14:03,680
left to right in a relative sense so

384
00:14:12,230 --> 00:14:10,069
feature that we're seeing very early on

385
00:14:14,150 --> 00:14:12,240
that you only had the slightest hint

386
00:14:15,509 --> 00:14:14,160
from orbit based on the orbiter data

387
00:14:16,949 --> 00:14:15,519
looking straight down you really need to

388
00:14:18,949 --> 00:14:16,959

be down on the ground and looking at a

389
00:14:20,790 --> 00:14:18,959
cross section

390
00:14:23,110 --> 00:14:20,800
but this kind of relationship is

391
00:14:25,910 --> 00:14:23,120
something that can help us understand uh

392
00:14:28,550 --> 00:14:25,920
the origin of these strata that clearly

393
00:14:31,430 --> 00:14:28,560
are the result of the examination of of

394
00:14:33,030 --> 00:14:31,440
of the larger uh sequence of strata that

395
00:14:35,750 --> 00:14:33,040
created mount sharp

396
00:14:37,670 --> 00:14:35,760
so the the earth has lessons to teach us

397
00:14:38,949 --> 00:14:37,680
about situations like this and if we go

398
00:14:40,790 --> 00:14:38,959
to the next one

399
00:14:43,110 --> 00:14:40,800
we see the grand canyon which we have

400
00:14:45,269 --> 00:14:43,120
always felt as a good analog for gail

401
00:14:47,910 --> 00:14:45,279
this goes back to work that

402
00:14:50,150 --> 00:14:47,920
mike and ken edgett did over a decade

403
00:14:51,829 --> 00:14:50,160
ago where they appreciated the thickness

404
00:14:54,069 --> 00:14:51,839
of strata that were there based on

405
00:14:56,150 --> 00:14:54,079
looking at images from the mock camera

406
00:14:58,550 --> 00:14:56,160
and they also anticipated that that

407
00:15:00,870 --> 00:14:58,560
contact with the white dots on it not

408
00:15:02,389 --> 00:15:00,880
this one but the one from gale

409
00:15:03,750 --> 00:15:02,399
may be what a geologist calls an

410
00:15:06,150 --> 00:15:03,760
unconformity where there was some

411
00:15:08,150 --> 00:15:06,160
profound change where you go from

412
00:15:09,670 --> 00:15:08,160
the lower layers to the upper layers and

413
00:15:10,870 --> 00:15:09,680

here in the grand canyon you have the

414
00:15:13,269 --> 00:15:10,880
same thing

415
00:15:16,150 --> 00:15:13,279
all the layers beneath that that train

416
00:15:17,430 --> 00:15:16,160
of white dots are inclined uh from left

417
00:15:19,590 --> 00:15:17,440
to right

418
00:15:21,829 --> 00:15:19,600
and everything above it is flat lying

419
00:15:24,790 --> 00:15:21,839
this is a very dramatic unconformity it

420
00:15:26,470 --> 00:15:24,800
represents a record failure an earth

421
00:15:28,710 --> 00:15:26,480
history of on the order of several

422
00:15:32,069 --> 00:15:28,720
hundred millions of years of time

423
00:15:35,189 --> 00:15:32,079
now we don't have any way to to do an

424
00:15:37,550 --> 00:15:35,199
analogous thing on on mars but by

425
00:15:41,509 --> 00:15:37,560
looking at these geometric uh

426
00:15:43,269 --> 00:15:41,519
discontinuities in in the in the strata

427
00:15:46,949 --> 00:15:43,279
we we can sense that there is a big

428
00:15:49,430 --> 00:15:46,959
change uh up mount sharp and and one day

429
00:15:51,350 --> 00:15:49,440
uh we hope uh towards end of our mission

430
00:15:52,790 --> 00:15:51,360
to get up and go across that contact and

431
00:15:54,629 --> 00:15:52,800
check it out

432
00:15:56,629 --> 00:15:54,639
and uh so with that i'll turn it over to

433
00:15:58,470 --> 00:15:56,639
paul to tell us about what sam's found

434
00:16:01,030 --> 00:15:58,480
yeah thanks very much john

435
00:16:04,230 --> 00:16:01,040
um i'm here really to tell you about uh

436
00:16:07,269 --> 00:16:04,240
completion uh of what's a real milestone

437
00:16:10,550 --> 00:16:07,279
for for the sam team completing uh an

438
00:16:13,350 --> 00:16:10,560

assessment of of the health of sam

439
00:16:16,310 --> 00:16:13,360
curiosity as you've gathered by now is a

440
00:16:17,670 --> 00:16:16,320
very uh complicated beast with lots of

441
00:16:19,590 --> 00:16:17,680
parts and

442
00:16:21,910 --> 00:16:19,600
the projects being very systematic about

443
00:16:24,790 --> 00:16:21,920
testing things out and we're we're

444
00:16:28,389 --> 00:16:24,800
trying to be patient and wait our turn

445
00:16:30,870 --> 00:16:28,399
and our turn uh is coming now uh and in

446
00:16:33,590 --> 00:16:30,880
fact we've completed uh a series of

447
00:16:34,710 --> 00:16:33,600
tests that tell us how sam's performing

448
00:16:36,310 --> 00:16:34,720
uh

449
00:16:38,710 --> 00:16:36,320
why don't you bring up the first graphic

450
00:16:40,310 --> 00:16:38,720
before i go into the test i'll tell you

451
00:16:45,430 --> 00:16:40,320
just a little bit remind you a little

452
00:16:50,870 --> 00:16:48,150
those images are just spectacular so

453
00:16:52,870 --> 00:16:50,880
mass cam is kind of the eyes of

454
00:16:54,389 --> 00:16:52,880
curiosity and

455
00:16:57,110 --> 00:16:54,399
we think of ourselves a little bit as a

456
00:16:59,350 --> 00:16:57,120
nose of curiosity and we're we're

457
00:17:02,150 --> 00:16:59,360
getting ready to start sniffing and we

458
00:17:04,789 --> 00:17:02,160
sniff both atmospheric gases and

459
00:17:06,949 --> 00:17:04,799
gases that we drive off of solids and

460
00:17:08,630 --> 00:17:06,959
the tests that we've carried out up to

461
00:17:10,150 --> 00:17:08,640
this point and the test i'm going to

462
00:17:11,829 --> 00:17:10,160
talk about a little bit more detail is

463
00:17:13,429 --> 00:17:11,839

really the fourth test have been

464
00:17:15,270 --> 00:17:13,439
designed to make sure that all these

465
00:17:17,110 --> 00:17:15,280
these pieces are working

466
00:17:19,110 --> 00:17:17,120
the first test we did was just kind of

467
00:17:21,590 --> 00:17:19,120
an aliveness test we turned on for a few

468
00:17:22,710 --> 00:17:21,600
minutes and sam comes back with sam-i-am

469
00:17:23,750 --> 00:17:22,720
i am sam

470
00:17:25,510 --> 00:17:23,760
and

471
00:17:28,630 --> 00:17:25,520
we know that we're talking to sam but it

472
00:17:31,270 --> 00:17:28,640
also gets data on all the sensors

473
00:17:33,510 --> 00:17:31,280
the next test really was to go through a

474
00:17:35,270 --> 00:17:33,520
much more comprehensive test this was

475
00:17:37,430 --> 00:17:35,280
some days ago

476
00:17:39,510 --> 00:17:37,440
where we turn on all the heaters and

477
00:17:42,710 --> 00:17:39,520
look at a temperature response it's

478
00:17:45,909 --> 00:17:42,720
about an hour long test that was fine

479
00:17:48,270 --> 00:17:45,919
the third thing we do is uh

480
00:17:49,990 --> 00:17:48,280
one part of sam is this

481
00:17:53,190 --> 00:17:50,000
electromechanical system where we

482
00:17:55,909 --> 00:17:53,200
process solid samples we put a sample

483
00:17:57,750 --> 00:17:55,919
under the ssit the solid sample inlet

484
00:18:00,230 --> 00:17:57,760
tube that you see in the right

485
00:18:01,990 --> 00:18:00,240
frame there and it gets shaken the

486
00:18:04,230 --> 00:18:02,000
sample goes down into a cup we move the

487
00:18:06,870 --> 00:18:04,240
cup into an oven we heat it up and we

488
00:18:08,070 --> 00:18:06,880

sniff those gases with with multiple

489
00:18:09,110 --> 00:18:08,080
instruments

490
00:18:11,590 --> 00:18:09,120
and

491
00:18:13,190 --> 00:18:11,600
so what we did in the third test was

492
00:18:15,110 --> 00:18:13,200
make sure that that system was working

493
00:18:16,950 --> 00:18:15,120
and it was working just fine

494
00:18:19,430 --> 00:18:16,960
and but we still hadn't turned on our

495
00:18:20,549 --> 00:18:19,440
pumps uh we hadn't turned on uh two of

496
00:18:21,990 --> 00:18:20,559
the main instruments the mass

497
00:18:24,549 --> 00:18:22,000
spectrometer and the tunable laser

498
00:18:27,590 --> 00:18:24,559
spectrometer so that's what we did we

499
00:18:29,590 --> 00:18:27,600
got the data saturday morning at 5 am

500
00:18:31,990 --> 00:18:29,600
and everything worked beautifully so it

501
00:18:33,909 --> 00:18:32,000
was it was really a big milestone

502
00:18:36,789 --> 00:18:33,919
for the team

503
00:18:40,549 --> 00:18:38,710
a combination as i mentioned of three

504
00:18:41,990 --> 00:18:40,559
instruments but then it's glued together

505
00:18:44,870 --> 00:18:42,000
with this

506
00:18:46,710 --> 00:18:44,880
set of transfer tubes that we heat up

507
00:18:48,630 --> 00:18:46,720
the sample manipulation system that i

508
00:18:49,590 --> 00:18:48,640
mentioned and so on so it's really a

509
00:18:51,669 --> 00:18:49,600
fairly

510
00:18:55,110 --> 00:18:51,679
complicated device we've had

511
00:18:57,029 --> 00:18:55,120
many dozens of talented engineers

512
00:18:58,630 --> 00:18:57,039
all over the country and in fact it's an

513
00:19:01,270 --> 00:18:58,640

international effort

514
00:19:03,750 --> 00:19:01,280
the tunable laser spectrometer in in sam

515
00:19:05,909 --> 00:19:03,760
was developed right here at jpl

516
00:19:09,590 --> 00:19:05,919
by chris webster's team the gas

517
00:19:12,310 --> 00:19:09,600
chromatograph was developed in in france

518
00:19:13,909 --> 00:19:12,320
by michelle cabana and his team the mass

519
00:19:15,830 --> 00:19:13,919
spectrometer was developed at goddard

520
00:19:20,390 --> 00:19:15,840
and then all this this system was

521
00:19:21,830 --> 00:19:20,400
integrated uh and tested uh at goddard

522
00:19:24,310 --> 00:19:21,840
so uh

523
00:19:26,390 --> 00:19:24,320
we also had engineers in in many states

524
00:19:29,270 --> 00:19:26,400
kind of contributing remotely uh

525
00:19:31,270 --> 00:19:29,280
michigan florida montana red states blue

526
00:19:33,430 --> 00:19:31,280
states all over the country

527
00:19:35,669 --> 00:19:33,440
um and uh so this really was an

528
00:19:37,750 --> 00:19:35,679
assessment of sam's health

529
00:19:39,350 --> 00:19:37,760
and let me talk a little bit about the

530
00:19:42,950 --> 00:19:39,360
test then

531
00:19:46,630 --> 00:19:42,960
this test was designed to

532
00:19:48,230 --> 00:19:46,640
take a brief sniff of mars atmosphere

533
00:19:49,990 --> 00:19:48,240
and then put some of that gas in the

534
00:19:53,110 --> 00:19:50,000
mass spectrometer and some of it in the

535
00:19:55,830 --> 00:19:53,120
tunable laser spectrometer both to look

536
00:19:57,909 --> 00:19:55,840
for isotopes heavy versus light light

537
00:20:00,390 --> 00:19:57,919
elements and compounds and to look at

538
00:20:02,230 --> 00:20:00,400

the major constituents of the gas but it

539
00:20:04,390 --> 00:20:02,240
was primarily an engineering test see if

540
00:20:05,430 --> 00:20:04,400
cfm's healthy and if the instruments

541
00:20:08,230 --> 00:20:05,440
work

542
00:20:10,390 --> 00:20:08,240
the one little blip we had actually was

543
00:20:11,750 --> 00:20:10,400
that we had brought along a little bit

544
00:20:14,149 --> 00:20:11,760
more of

545
00:20:16,149 --> 00:20:14,159
a combination of

546
00:20:17,909 --> 00:20:16,159
earth atmosphere that had very slowly

547
00:20:19,110 --> 00:20:17,919
leaked into the tls

548
00:20:21,270 --> 00:20:19,120
and

549
00:20:23,270 --> 00:20:21,280
a bit of calibration gas

550
00:20:25,830 --> 00:20:23,280
and so when we tried to pump that out of

551
00:20:27,110 --> 00:20:25,840
the tls the the pump current went up a

552
00:20:28,390 --> 00:20:27,120
little bit and did what it was supposed

553
00:20:30,870 --> 00:20:28,400
to do it said i'm not too happy with

554
00:20:32,789 --> 00:20:30,880
that current and it shut itself down but

555
00:20:34,390 --> 00:20:32,799
as a consequence of that the very first

556
00:20:37,190 --> 00:20:34,400
sample we did not measure

557
00:20:39,990 --> 00:20:37,200
mars atmosphere we measured florida air

558
00:20:41,669 --> 00:20:40,000
and our calibration gas which was of

559
00:20:43,270 --> 00:20:41,679
quite less interest to the science team

560
00:20:45,270 --> 00:20:43,280
but nevertheless we had a really good

561
00:20:47,590 --> 00:20:45,280
exercise uh looking at how the

562
00:20:50,630 --> 00:20:47,600
instrument uh worked

563
00:20:52,870 --> 00:20:50,640

so in summary uh the instruments work

564
00:20:55,430 --> 00:20:52,880
beautifully the tls and the

565
00:20:57,270 --> 00:20:55,440
mass spectrometer we still have to

566
00:21:00,070 --> 00:20:57,280
wait for tests of the gas chromatograph

567
00:21:02,310 --> 00:21:00,080
that will come some souls down the road

568
00:21:03,750 --> 00:21:02,320
and we're looking forward in a few souls

569
00:21:06,070 --> 00:21:03,760
really to getting our first sniff of

570
00:21:08,789 --> 00:21:06,080
mars atmosphere and

571
00:21:10,870 --> 00:21:08,799
learning more about the history of mars

572
00:21:12,470 --> 00:21:10,880
uh what the atmosphere is telling us

573
00:21:15,430 --> 00:21:12,480
with regard to its isotopes and its

574
00:21:17,750 --> 00:21:15,440
composition and then ultimately how that

575
00:21:18,950 --> 00:21:17,760
compares with gases that come out of

576
00:21:20,390 --> 00:21:18,960
rocks so

577
00:21:22,070 --> 00:21:20,400
uh that might have been formed billions

578
00:21:23,510 --> 00:21:22,080
of years ago so it's really going to be

579
00:21:24,870 --> 00:21:23,520
fun we're looking forward to getting in

580
00:21:26,470 --> 00:21:24,880
those layers that

581
00:21:28,230 --> 00:21:26,480
john and mike talked about

582
00:21:30,070 --> 00:21:28,240
and with that i'll hand it over to chad

583
00:21:31,750 --> 00:21:30,080
who's going to tell us about how the

584
00:21:33,350 --> 00:21:31,760
data all comes down and gets processed

585
00:21:34,710 --> 00:21:33,360
all right thanks paul yeah i'd like to

586
00:21:36,630 --> 00:21:34,720
share today a little bit of the story of

587
00:21:38,710 --> 00:21:36,640
how we bring the kinds of science data

588
00:21:40,710 --> 00:21:38,720

you're hearing about today back to earth

589
00:21:42,830 --> 00:21:40,720
one of the challenges of a landed

590
00:21:45,909 --> 00:21:42,840
mission even for a rover the size of

591
00:21:47,510 --> 00:21:45,919
curiosity is the the daunting job of

592
00:21:49,190 --> 00:21:47,520
transmitting data from the surface of

593
00:21:51,830 --> 00:21:49,200
mars all the way back to earth which can

594
00:21:54,789 --> 00:21:51,840
be up to 400 million kilometers away

595
00:21:56,230 --> 00:21:54,799
and a rover like curiosity has a

596
00:21:57,510 --> 00:21:56,240
relatively limited capability to

597
00:21:58,549 --> 00:21:57,520
transmit on that direct direct-to-earth

598
00:22:00,549 --> 00:21:58,559
path

599
00:22:03,590 --> 00:22:00,559
it has a transmitter about 15 watts and

600
00:22:04,870 --> 00:22:03,600
a antenna about a foot in diameter and

601
00:22:06,549 --> 00:22:04,880
with that capability trying to

602
00:22:07,990 --> 00:22:06,559
communicate straight back to earth we're

603
00:22:09,909 --> 00:22:08,000
limited to data rates on the order of

604
00:22:11,270 --> 00:22:09,919
about a thousand bits per second

605
00:22:12,870 --> 00:22:11,280
and that's just not adequate to bring

606
00:22:14,950 --> 00:22:12,880
back the kind of science products that

607
00:22:17,029 --> 00:22:14,960
we're looking at today and so what we've

608
00:22:19,510 --> 00:22:17,039
done is take advantage of the uh the

609
00:22:21,990 --> 00:22:19,520
orbiting science satellites that we have

610
00:22:24,070 --> 00:22:22,000
around mars and use them as relay

611
00:22:24,830 --> 00:22:24,080
communications assets and essentially we

612
00:22:27,350 --> 00:22:24,840
have a

613
00:22:28,630 --> 00:22:27,360

telecommunications network around mars

614
00:22:29,510 --> 00:22:28,640
that's allowing us to bring that data

615
00:22:31,510 --> 00:22:29,520
back

616
00:22:34,149 --> 00:22:31,520
if i could have the first chart please

617
00:22:35,830 --> 00:22:34,159
we have three orbiters at mars today

618
00:22:38,310 --> 00:22:35,840
the odyssey spacecraft that was launched

619
00:22:40,149 --> 00:22:38,320
in 2001.

620
00:22:43,190 --> 00:22:40,159
esa's mars express spacecraft that was

621
00:22:45,990 --> 00:22:43,200
launched in 2003 and uh nasa's mars

622
00:22:47,430 --> 00:22:46,000
reconnaissance orbiter launched in 2005.

623
00:22:49,669 --> 00:22:47,440
all three of these orbiters were

624
00:22:51,909 --> 00:22:49,679
positioned on landing day to collect

625
00:22:53,510 --> 00:22:51,919
signals from msl as it landed during the

626
00:22:55,270 --> 00:22:53,520
seven minutes of terror of entry descent

627
00:22:57,270 --> 00:22:55,280
landing it was very important for us to

628
00:22:58,950 --> 00:22:57,280
capture that critical event telemetry

629
00:23:00,390 --> 00:22:58,960
and uh we took advantage of the unique

630
00:23:02,470 --> 00:23:00,400
capabilities of each of these orbiters

631
00:23:03,510 --> 00:23:02,480
to capture uh information about the

632
00:23:05,029 --> 00:23:03,520
landing

633
00:23:08,390 --> 00:23:05,039
since we've landed we've typically been

634
00:23:10,630 --> 00:23:08,400
using our nasa orbiters odyssey and mro

635
00:23:12,149 --> 00:23:10,640
to do the bulk of the data return and

636
00:23:13,590 --> 00:23:12,159
i'll show you in a second a little bit

637
00:23:15,669 --> 00:23:13,600
about why their orbits are particularly

638
00:23:17,029 --> 00:23:15,679

well suited uh for supporting the

639
00:23:18,230 --> 00:23:17,039
surface mission

640
00:23:20,230 --> 00:23:18,240
um

641
00:23:22,710 --> 00:23:20,240
and uh but but a very important aspect

642
00:23:24,950 --> 00:23:22,720
of our strategy is uh the esa's mars

643
00:23:26,630 --> 00:23:24,960
express spacecraft is available as an

644
00:23:28,390 --> 00:23:26,640
additional backup relay asset and that's

645
00:23:30,470 --> 00:23:28,400
an important part of the robustness of

646
00:23:33,110 --> 00:23:30,480
our telecommunication plan we have had a

647
00:23:35,029 --> 00:23:33,120
successful opportunity already on sol 13

648
00:23:36,630 --> 00:23:35,039
to demonstrate that we can flow data

649
00:23:38,630 --> 00:23:36,640
through mars express

650
00:23:39,990 --> 00:23:38,640
and back to earth

651
00:23:41,350 --> 00:23:40,000
okay if i could have the next chart

652
00:23:43,029 --> 00:23:41,360
please and this will give us a little

653
00:23:44,789 --> 00:23:43,039
bit of a view of what these orbits look

654
00:23:47,269 --> 00:23:44,799
like at mars you're seeing odyssey and

655
00:23:49,110 --> 00:23:47,279
mro they're in orbits of about 300 to

656
00:23:50,549 --> 00:23:49,120
400 kilometers and you can see as mro

657
00:23:52,789 --> 00:23:50,559
passes over the landing site it

658
00:23:55,430 --> 00:23:52,799
establishes a link these orbits are sped

659
00:23:57,909 --> 00:23:55,440
up these relay contacts last for about

660
00:23:59,990 --> 00:23:57,919
10 to 15 minutes typically you can see

661
00:24:02,149 --> 00:24:00,000
the orbit planes are fixed in

662
00:24:04,149 --> 00:24:02,159
orientation in a polar orbit and they're

663
00:24:07,590 --> 00:24:04,159

actually our two orbiters are positioned

664
00:24:10,549 --> 00:24:07,600
mro's around 3 p.m and 3 a.m local time

665
00:24:11,909 --> 00:24:10,559
on mars and odysseys about 3 4 p.m and 4

666
00:24:13,750 --> 00:24:11,919
a.m and you're looking at the afternoon

667
00:24:15,669 --> 00:24:13,760
side of the planet here so typically we

668
00:24:17,909 --> 00:24:15,679
have a relay opportunity with each of

669
00:24:19,830 --> 00:24:17,919
the orbiters in that afternoon portion

670
00:24:21,430 --> 00:24:19,840
you also saw the highly elliptical orbit

671
00:24:23,590 --> 00:24:21,440
of mars express

672
00:24:24,870 --> 00:24:23,600
in that visualization now we're down on

673
00:24:26,870 --> 00:24:24,880
the surface and this gives you a little

674
00:24:28,630 --> 00:24:26,880
bit of a view from uh

675
00:24:30,310 --> 00:24:28,640
from curiosity's perspective about what

676
00:24:32,230 --> 00:24:30,320
a relay pass looks like

677
00:24:33,909 --> 00:24:32,240
on in particular on this link to mars

678
00:24:35,750 --> 00:24:33,919
reconnaissance orbiter we have a new

679
00:24:38,070 --> 00:24:35,760
capability which we refer to as adaptive

680
00:24:39,669 --> 00:24:38,080
data rates so that as that orbiter rises

681
00:24:41,669 --> 00:24:39,679
in the sky and the quality of the link

682
00:24:43,350 --> 00:24:41,679
improves the two radios at each end of

683
00:24:45,909 --> 00:24:43,360
the link are able to exchange messages

684
00:24:48,230 --> 00:24:45,919
with each other and optimize

685
00:24:50,070 --> 00:24:48,240
the data rate as a function of time over

686
00:24:51,830 --> 00:24:50,080
the past to constantly be using the

687
00:24:53,269 --> 00:24:51,840
maximum data rate that the communication

688
00:24:55,510 --> 00:24:53,279

channel can support at that point in

689
00:24:57,190 --> 00:24:55,520
time it's the first time we've exercised

690
00:24:59,669 --> 00:24:57,200
that uh over the weekend was the first

691
00:25:01,750 --> 00:24:59,679
time we had a chance to use that it

692
00:25:03,029 --> 00:25:01,760
performed fabulously we set a record for

693
00:25:04,950 --> 00:25:03,039
the amount of data we were able to bring

694
00:25:07,029 --> 00:25:04,960
back on a single pass even though that

695
00:25:09,269 --> 00:25:07,039
pass was not at a particularly high data

696
00:25:10,310 --> 00:25:09,279
rate or a particularly high elevation

697
00:25:11,830 --> 00:25:10,320
angle

698
00:25:13,110 --> 00:25:11,840
and so that really bears out the

699
00:25:14,950 --> 00:25:13,120
strength of this adaptive data rate

700
00:25:16,470 --> 00:25:14,960
algorithm to be able to take advantage

701
00:25:18,630 --> 00:25:16,480
of the geometry of the past vary the

702
00:25:21,669 --> 00:25:18,640
data rate continuously as you fly across

703
00:25:23,510 --> 00:25:21,679
the sky and move a large amount of data

704
00:25:25,110 --> 00:25:23,520
so just to conclude if i could have the

705
00:25:26,789 --> 00:25:25,120
last chart and this is sort of how we're

706
00:25:29,430 --> 00:25:26,799
doing to date

707
00:25:32,390 --> 00:25:29,440
we're looking at 20 saws here and you're

708
00:25:34,149 --> 00:25:32,400
seeing a chart of the cumulative volume

709
00:25:36,950 --> 00:25:34,159
of data that we've returned from

710
00:25:38,870 --> 00:25:36,960
curiosity via the two nasa orbiters

711
00:25:40,070 --> 00:25:38,880
again we've only had one short

712
00:25:42,070 --> 00:25:40,080
relay pass that we've conducted with

713
00:25:43,029 --> 00:25:42,080

mars express that was very successful in

714
00:25:45,350 --> 00:25:43,039
terms of demonstrating our

715
00:25:46,789 --> 00:25:45,360
interoperability uh but

716
00:25:48,149 --> 00:25:46,799
not a significant contributor to the

717
00:25:49,830 --> 00:25:48,159
total amount of data volume that we

718
00:25:51,269 --> 00:25:49,840
brought back to date

719
00:25:53,510 --> 00:25:51,279
and you can see that today we've already

720
00:25:55,669 --> 00:25:53,520
brought back in excess of seven gigabits

721
00:25:58,310 --> 00:25:55,679
of data just by contrast that's about a

722
00:25:59,909 --> 00:25:58,320
factor of two to three more than uh we

723
00:26:02,630 --> 00:25:59,919
have brought back we had brought back

724
00:26:04,630 --> 00:26:02,640
from spirit opportunity or phoenix at

725
00:26:07,590 --> 00:26:04,640
that same point in the mission 20 sols

726
00:26:09,669 --> 00:26:07,600
in uh and that's really a tribute to the

727
00:26:11,350 --> 00:26:09,679
particularly the new capabilities on the

728
00:26:13,110 --> 00:26:11,360
mars reconnaissance orbiter spacecraft

729
00:26:15,510 --> 00:26:13,120
where we have what we call an electro

730
00:26:17,990 --> 00:26:15,520
radio on each of those orbiters on on

731
00:26:19,430 --> 00:26:18,000
mro as well as on msl

732
00:26:21,269 --> 00:26:19,440
allows us to go to much higher data

733
00:26:22,710 --> 00:26:21,279
rates instantaneous rates of up to two

734
00:26:24,230 --> 00:26:22,720
megabits per second

735
00:26:25,510 --> 00:26:24,240
and this adaptive data rate capability

736
00:26:26,470 --> 00:26:25,520
that allows us to bring a lot more data

737
00:26:28,710 --> 00:26:26,480
back

738
00:26:29,990 --> 00:26:28,720

so uh i think at this point uh i'll hand

739
00:26:31,990 --> 00:26:30,000
it back to jane

740
00:26:34,710 --> 00:26:32,000
thank you very much and we'll start our

741
00:26:36,070 --> 00:26:34,720
q a period for reporters we do have some

742
00:26:38,870 --> 00:26:36,080
reporters who are calling in with

743
00:26:40,630 --> 00:26:38,880
questions today but let's take a look

744
00:26:42,630 --> 00:26:40,640
and see if anybody here at jpl has a

745
00:26:44,390 --> 00:26:42,640
question if you do please raise your

746
00:26:46,149 --> 00:26:44,400
hand and wait for the mic to come to you

747
00:26:48,390 --> 00:26:46,159
and then state your name and your

748
00:26:49,669 --> 00:26:48,400
affiliation first question

749
00:26:53,110 --> 00:26:49,679
emily

750
00:26:54,549 --> 00:26:53,120
society i have a question about the

751
00:26:56,070 --> 00:26:54,559
geology in the hills that you're looking

752
00:26:58,070 --> 00:26:56,080
at the comparison that you made to the

753
00:26:59,830 --> 00:26:58,080
grand canyon showed a angular

754
00:27:01,350 --> 00:26:59,840
unconformity where the beds were angled

755
00:27:02,870 --> 00:27:01,360
chopped off and then you had flat lying

756
00:27:04,310 --> 00:27:02,880
beds i don't know if i've ever seen

757
00:27:06,630 --> 00:27:04,320
anything where the beds on top were

758
00:27:08,549 --> 00:27:06,640
inclined see can you talk about the kind

759
00:27:11,590 --> 00:27:08,559
of environment that might have made that

760
00:27:13,830 --> 00:27:11,600
that sort of um bed form

761
00:27:15,990 --> 00:27:13,840
uh that's that's a really good question

762
00:27:18,070 --> 00:27:16,000
uh the the layers are tilted in the

763
00:27:20,470 --> 00:27:18,080

grand canyon because of plate tectonics

764
00:27:23,110 --> 00:27:20,480
here on earth so it's it's typical to

765
00:27:25,430 --> 00:27:23,120
see older layers be more deformed and

766
00:27:27,510 --> 00:27:25,440
more rotated than the ones above them

767
00:27:30,149 --> 00:27:27,520
in this case you have flat lying layers

768
00:27:31,029 --> 00:27:30,159
on mars overlaying by tilted layers

769
00:27:32,549 --> 00:27:31,039
and

770
00:27:34,870 --> 00:27:32,559
you know the science team of course is

771
00:27:37,029 --> 00:27:34,880
deliberating over what this means but in

772
00:27:39,269 --> 00:27:37,039
the absence of plate tectonics i i think

773
00:27:40,950 --> 00:27:39,279
you're you're really kind of pretty much

774
00:27:43,110 --> 00:27:40,960
looking at some kind of a mechanism that

775
00:27:44,710 --> 00:27:43,120
relates back to

776
00:27:48,310 --> 00:27:44,720
the physical environment in which the

777
00:27:50,389 --> 00:27:48,320
strata accumulated and and uh

778
00:27:53,269 --> 00:27:50,399
you know we we don't have too much more

779
00:27:55,669 --> 00:27:53,279
insight into that right now but uh it

780
00:27:57,510 --> 00:27:55,679
does require a flux of material

781
00:28:00,070 --> 00:27:57,520
presumably from left to right in that

782
00:28:01,750 --> 00:28:00,080
image that you're seeing there so some

783
00:28:04,389 --> 00:28:01,760
it somehow relates to the depositional

784
00:28:05,830 --> 00:28:04,399
mechanics we would guess yeah

785
00:28:07,750 --> 00:28:05,840
and if i could just ask another quick

786
00:28:10,070 --> 00:28:07,760
question of mike first of all that

787
00:28:12,389 --> 00:28:10,080
picture was stunning so congratulations

788
00:28:14,389 --> 00:28:12,399

on the performance of your camera um the

789
00:28:16,149 --> 00:28:14,399
the mosaic is really really beautiful

790
00:28:17,669 --> 00:28:16,159
but there's one missing part to it the

791
00:28:19,029 --> 00:28:17,679
rover at the bottom and i'm wondering if

792
00:28:20,310 --> 00:28:19,039
you're planning on taking a mosaic that

793
00:28:22,389 --> 00:28:20,320
will include

794
00:28:24,470 --> 00:28:22,399
the rover in color as well

795
00:28:27,110 --> 00:28:24,480
not likely

796
00:28:28,789 --> 00:28:27,120
it's not part of our requirements so i

797
00:28:31,110 --> 00:28:28,799
it's bits you have to bring back and

798
00:28:32,950 --> 00:28:31,120
it's planning you have to put into it

799
00:28:34,710 --> 00:28:32,960
i'm not sure exactly how many more

800
00:28:36,549 --> 00:28:34,720
mosaics we're going to end up getting

801
00:28:38,149 --> 00:28:36,559
once we release the camera to the

802
00:28:40,789 --> 00:28:38,159
science team they're going to want to go

803
00:28:42,230 --> 00:28:40,799
shoot lots of special purpose targets i

804
00:28:43,269 --> 00:28:42,240
think

805
00:28:45,029 --> 00:28:43,279
thanks

806
00:28:49,350 --> 00:28:45,039
okay do we have any more questions here

807
00:28:52,389 --> 00:28:50,549
all right why don't we jump to the

808
00:28:54,710 --> 00:28:52,399
phones now we have a question let's take

809
00:28:56,389 --> 00:28:54,720
a question from irene klotz at reuters

810
00:28:58,310 --> 00:28:56,399
hello irene

811
00:29:00,789 --> 00:28:58,320
hi thanks very much i actually have a

812
00:29:03,269 --> 00:29:00,799
couple questions um the first probably

813
00:29:06,070 --> 00:29:03,279

for chad regarding that um

814
00:29:08,710 --> 00:29:06,080
the relay broadcast of uh charlie

815
00:29:11,510 --> 00:29:08,720
bolden's voice could you just explain if

816
00:29:13,830 --> 00:29:11,520
this was some technical accomplishment

817
00:29:15,830 --> 00:29:13,840
or could this have been done

818
00:29:18,549 --> 00:29:15,840
before with uh

819
00:29:20,230 --> 00:29:18,559
with with other rovers if someone had

820
00:29:22,549 --> 00:29:20,240
thought or had wanted to do it i guess i

821
00:29:25,029 --> 00:29:22,559
just really didn't understand beyond

822
00:29:28,549 --> 00:29:25,039
kind of the pr value

823
00:29:30,310 --> 00:29:28,559
what it is that you are demonstrating

824
00:29:32,630 --> 00:29:30,320
okay my understanding is that the the

825
00:29:34,630 --> 00:29:32,640
volume of data in that audio file is on

826
00:29:36,950 --> 00:29:34,640
the order of about four megabits that's

827
00:29:38,710 --> 00:29:36,960
uh certainly something that a capability

828
00:29:41,029 --> 00:29:38,720
we could have

829
00:29:43,990 --> 00:29:41,039
executed in the past on prior missions i

830
00:29:45,350 --> 00:29:44,000
think the the growth in our data uh

831
00:29:47,909 --> 00:29:45,360
transmission capabilities on this

832
00:29:50,070 --> 00:29:47,919
mission allows us to to do this while

833
00:29:53,029 --> 00:29:50,080
also not sacrificing any of our

834
00:29:56,070 --> 00:29:53,039
science bandwidth so uh yeah that would

835
00:29:58,950 --> 00:29:56,080
be my my my thoughts on that

836
00:30:00,549 --> 00:29:58,960
okay um thanks very much and uh for john

837
00:30:03,750 --> 00:30:00,559
um i just wanted to follow up a little

838
00:30:05,350 --> 00:30:03,760

bit more about the uh the angles um that

839
00:30:08,310 --> 00:30:05,360
that were demonstrated in that in that

840
00:30:11,750 --> 00:30:08,320
picture um do you do you have some uh

841
00:30:14,310 --> 00:30:11,760
measurement of the of the non-conform

842
00:30:17,269 --> 00:30:14,320
conformity in other words what's the

843
00:30:19,990 --> 00:30:17,279
angle of the top layers compared to the

844
00:30:21,990 --> 00:30:20,000
flat ones and is there anything

845
00:30:23,750 --> 00:30:22,000
on earth that forms things like that

846
00:30:26,549 --> 00:30:23,760
aside from the plate tectonics that

847
00:30:29,510 --> 00:30:26,559
you've already discussed

848
00:30:32,549 --> 00:30:29,520
uh yeah we will eventually get to to uh

849
00:30:35,510 --> 00:30:32,559
to measuring those those angles uh mike

850
00:30:37,269 --> 00:30:35,520
has been working on sequences to execute

851
00:30:39,430 --> 00:30:37,279
that give us a

852
00:30:41,190 --> 00:30:39,440
long baseline stereo and then from that

853
00:30:43,269 --> 00:30:41,200
we should be able to actually

854
00:30:44,149 --> 00:30:43,279
quantitatively determine the angles up

855
00:30:45,029 --> 00:30:44,159
there

856
00:30:47,110 --> 00:30:45,039
um

857
00:30:49,510 --> 00:30:47,120
again you know on earth there are a

858
00:30:50,630 --> 00:30:49,520
whole host of of mechanisms that can

859
00:30:53,669 --> 00:30:50,640
generate

860
00:30:56,470 --> 00:30:53,679
inclined strata that have only to do

861
00:31:00,070 --> 00:30:56,480
with the depositional mechanics of of

862
00:31:01,669 --> 00:31:00,080
the process itself if for example

863
00:31:05,269 --> 00:31:01,679

you took a cross-section through a

864
00:31:07,269 --> 00:31:05,279
volcano all the layers would be dipping

865
00:31:08,789 --> 00:31:07,279
at a steep angle that would be

866
00:31:10,149 --> 00:31:08,799
corresponding to the surface of the

867
00:31:12,950 --> 00:31:10,159
volcano

868
00:31:15,990 --> 00:31:12,960
if it's volcanic material

869
00:31:18,870 --> 00:31:16,000
you could imagine other situations where

870
00:31:20,070 --> 00:31:18,880
sediment gets dumped down at an angle

871
00:31:22,549 --> 00:31:20,080
and uh

872
00:31:24,230 --> 00:31:22,559
that are subaqueous in origin uh the

873
00:31:27,590 --> 00:31:24,240
wind does that every time it makes a

874
00:31:30,310 --> 00:31:27,600
sand dune you have uh strata that dip at

875
00:31:32,950 --> 00:31:30,320
the angle of the front of the sand dune

876
00:31:35,110 --> 00:31:32,960
so you know the cool thing here is just

877
00:31:36,630 --> 00:31:35,120
that the cameras have discovered

878
00:31:39,029 --> 00:31:36,640
something that we were completely

879
00:31:41,110 --> 00:31:39,039
ignorant of uh prior to that

880
00:31:42,310 --> 00:31:41,120
it's it's a non-unique interpretation

881
00:31:44,070 --> 00:31:42,320
it's going to take the science team a

882
00:31:45,909 --> 00:31:44,080
lot of work to get at it and probably

883
00:31:48,310 --> 00:31:45,919
we're going to have to drive up there to

884
00:31:50,230 --> 00:31:48,320
see what those strata are made out of

885
00:31:53,029 --> 00:31:50,240
but a lot of people ask the question are

886
00:31:55,029 --> 00:31:53,039
there are there big surprises uh that

887
00:31:56,389 --> 00:31:55,039
that one you've since you've landed that

888
00:31:58,710 --> 00:31:56,399

you see

889
00:32:00,470 --> 00:31:58,720
and and so far it's kind of looked like

890
00:32:01,909 --> 00:32:00,480
terrains that we're familiar with and

891
00:32:04,149 --> 00:32:01,919
things like that and this this thing

892
00:32:05,590 --> 00:32:04,159
just kind of jumped out at us as being

893
00:32:11,029 --> 00:32:05,600
something very different from what we

894
00:32:15,669 --> 00:32:13,350
thank you

895
00:32:17,509 --> 00:32:15,679
okay john i understand we have something

896
00:32:20,070 --> 00:32:17,519
that has just come in

897
00:32:21,990 --> 00:32:20,080
um a picture that we wanted to share

898
00:32:24,070 --> 00:32:22,000
with our audience

899
00:32:26,070 --> 00:32:24,080
uh so though we just had this is late

900
00:32:28,310 --> 00:32:26,080
breaking news this just came in down

901
00:32:31,590 --> 00:32:28,320
from mars in the last hour and it shows

902
00:32:33,830 --> 00:32:31,600
the tracks of our most recent drive

903
00:32:35,669 --> 00:32:33,840
and this was now this is the result of

904
00:32:38,389 --> 00:32:35,679
the first drive that was commanded

905
00:32:41,750 --> 00:32:38,399
explicitly for the purpose of science

906
00:32:44,630 --> 00:32:41,760
and it positions the rover directly over

907
00:32:46,870 --> 00:32:44,640
the most prominent of the scour marks

908
00:32:48,230 --> 00:32:46,880
that was created by thruster impingement

909
00:32:49,590 --> 00:32:48,240
during edl

910
00:32:51,750 --> 00:32:49,600
so if you go all the way back to the

911
00:32:53,350 --> 00:32:51,760
time when we first landed i made the

912
00:32:55,590 --> 00:32:53,360
comment about how

913
00:32:57,590 --> 00:32:55,600

we've we've basically blown away all the

914
00:32:59,190 --> 00:32:57,600
surface materials and we get kind of a

915
00:33:01,509 --> 00:32:59,200
freebie sample

916
00:33:03,190 --> 00:33:01,519
well now we're sampling it with the dan

917
00:33:05,990 --> 00:33:03,200
instrument which is the neutron

918
00:33:06,870 --> 00:33:06,000
generator and that will acquire

919
00:33:10,230 --> 00:33:06,880
data

920
00:33:11,909 --> 00:33:10,240
over this bare rock to compare with uh

921
00:33:13,029 --> 00:33:11,919
measurements that were made where the

922
00:33:15,509 --> 00:33:13,039
soil

923
00:33:17,269 --> 00:33:15,519
cover existed and uh and the science

924
00:33:19,110 --> 00:33:17,279
team has also planned

925
00:33:22,070 --> 00:33:19,120
uh observations with the chemcam

926
00:33:24,470 --> 00:33:22,080
instrument on that scour mark as well

927
00:33:25,430 --> 00:33:24,480
so we're going to be collecting quite a

928
00:33:27,590 --> 00:33:25,440
broad

929
00:33:29,669 --> 00:33:27,600
range of measurements over this this

930
00:33:32,149 --> 00:33:29,679
feature uh before

931
00:33:35,029 --> 00:33:32,159
uh in a few days time we we drive away

932
00:33:36,549 --> 00:33:35,039
uh to the east towards glenelg

933
00:33:39,190 --> 00:33:36,559
thank you john it's always fun to have

934
00:33:41,350 --> 00:33:39,200
breaking news in a live news conference

935
00:33:44,070 --> 00:33:41,360
let's take a question from the phone leo

936
00:33:45,669 --> 00:33:44,080
enright with irish tv

937
00:33:47,590 --> 00:33:45,679
thanks jane

938
00:33:49,669 --> 00:33:47,600

just looking at that picture

939
00:33:50,630 --> 00:33:49,679
it's obvious you can see the wheel

940
00:33:52,789 --> 00:33:50,640
tracks

941
00:33:54,789 --> 00:33:52,799
almost like footprints

942
00:33:56,230 --> 00:33:54,799
and i think for the european audience

943
00:33:58,310 --> 00:33:56,240
it's late at night it'll be tomorrow

944
00:34:00,310 --> 00:33:58,320
morning really when most people get to

945
00:34:03,269 --> 00:34:00,320
hear this but they're still thinking of

946
00:34:04,310 --> 00:34:03,279
neil armstrong and i'm thinking maybe

947
00:34:06,230 --> 00:34:04,320
john

948
00:34:09,430 --> 00:34:06,240
and mike particularly because you've

949
00:34:13,349 --> 00:34:09,440
devoted so much time as explorers on

950
00:34:16,950 --> 00:34:13,359
mars uh when you look at these uh

951
00:34:19,669 --> 00:34:16,960
wheel prints uh how do you connect those

952
00:34:22,470 --> 00:34:19,679
with the boot prints that neil armstrong

953
00:34:25,030 --> 00:34:22,480
made all those years ago

954
00:34:27,430 --> 00:34:25,040
uh well i i think the analogy is is

955
00:34:29,190 --> 00:34:27,440
really a terrific one because if it's

956
00:34:30,470 --> 00:34:29,200
not in this image but if you go back to

957
00:34:32,950 --> 00:34:30,480
some things

958
00:34:34,550 --> 00:34:32,960
we've released already

959
00:34:36,550 --> 00:34:34,560
you will see what i think will be an

960
00:34:38,790 --> 00:34:36,560
iconic image of the mission where you

961
00:34:40,470 --> 00:34:38,800
see the four scour marks made by the

962
00:34:42,790 --> 00:34:40,480
thruster impingement

963
00:34:45,270 --> 00:34:42,800

with wheel tracks that basically begin

964
00:34:47,109 --> 00:34:45,280
from nowhere so you know a spacecraft

965
00:34:49,669 --> 00:34:47,119
sat down

966
00:34:51,750 --> 00:34:49,679
the rover was dropped onto the surface

967
00:34:53,829 --> 00:34:51,760
and and you see this track back to the

968
00:34:55,190 --> 00:34:53,839
origin and uh

969
00:34:57,910 --> 00:34:55,200
and now what we're seeing here is the

970
00:35:01,829 --> 00:34:57,920
results of tracks involving the first

971
00:35:04,390 --> 00:35:01,839
motions of of the of the rover

972
00:35:06,390 --> 00:35:04,400
but i i think you know instead of a

973
00:35:09,109 --> 00:35:06,400
human it's a robot pretty much doing the

974
00:35:13,430 --> 00:35:11,270
all right our next question is going to

975
00:35:16,230 --> 00:35:13,440
come from todd halverson at florida

976
00:35:18,870 --> 00:35:16,240
today

977
00:35:21,109 --> 00:35:18,880
you with us todd

978
00:35:22,710 --> 00:35:21,119
uh maybe we'll have to get back to todd

979
00:35:25,670 --> 00:35:22,720
he may have been

980
00:35:30,470 --> 00:35:27,910
okay i'm here can you hear me now oh yes

981
00:35:33,510 --> 00:35:30,480
hi todd go ahead with your question i'm

982
00:35:35,190 --> 00:35:33,520
sorry i pushed the wrong button on the

983
00:35:37,990 --> 00:35:35,200
telephone um

984
00:35:39,349 --> 00:35:38,000
i'm wondering i i'm i'm looking at these

985
00:35:42,069 --> 00:35:39,359
uh

986
00:35:45,030 --> 00:35:42,079
these pictures and and listening to

987
00:35:47,829 --> 00:35:45,040
charlie bolden's voice and

988
00:35:50,390 --> 00:35:47,839

and i'm wondering if somebody can

989
00:35:53,589 --> 00:35:50,400
talk about the significance of

990
00:35:55,190 --> 00:35:53,599
bringing back a human voice from another

991
00:35:58,390 --> 00:35:55,200
planet and

992
00:36:00,870 --> 00:35:58,400
and uh you know i i think about the

993
00:36:02,950 --> 00:36:00,880
times when i was a kid and i would hear

994
00:36:06,230 --> 00:36:02,960
voice transmissions from

995
00:36:11,030 --> 00:36:06,240
the moon back to earth so uh maybe you

996
00:36:12,950 --> 00:36:11,040
can distinguish this as a a first for a

997
00:36:15,190 --> 00:36:12,960
planetary mission rather than a mission

998
00:36:17,589 --> 00:36:15,200
to the moon is that your point

999
00:36:21,750 --> 00:36:19,750
yeah i think the the you you hit the

1000
00:36:23,589 --> 00:36:21,760
point exactly that this is the first

1001
00:36:25,750 --> 00:36:23,599
time that we've had a human voice

1002
00:36:28,550 --> 00:36:25,760
transmitted back from another planet

1003
00:36:29,990 --> 00:36:28,560
obviously in the case of neil armstrong

1004
00:36:31,430 --> 00:36:30,000
and his

1005
00:36:33,829 --> 00:36:31,440
famous quotes from the surface of the

1006
00:36:36,870 --> 00:36:33,839
moon we do have that statement with made

1007
00:36:39,510 --> 00:36:36,880
by a human present in the location where

1008
00:36:41,109 --> 00:36:39,520
it originated we aren't quite yet at the

1009
00:36:43,829 --> 00:36:41,119
point where we actually will have a

1010
00:36:46,870 --> 00:36:43,839
human present on the surface of mars to

1011
00:36:48,550 --> 00:36:46,880
make those first words yet but this

1012
00:36:50,390 --> 00:36:48,560
represents the first opportunity to

1013
00:36:52,069 --> 00:36:50,400

actually have a human voice that is

1014
00:36:54,390 --> 00:36:52,079
transmitted back from the surface of a

1015
00:36:56,069 --> 00:36:54,400
planet beyond our own

1016
00:36:58,230 --> 00:36:56,079
and and that's really the significance

1017
00:37:00,470 --> 00:36:58,240
that we attach to it and we do recognize

1018
00:37:02,150 --> 00:37:00,480
that this is a data file that was sent

1019
00:37:04,390 --> 00:37:02,160
up to the rover stored on board and then

1020
00:37:07,109 --> 00:37:04,400
sent back from the surface of mars

1021
00:37:09,430 --> 00:37:07,119
and so although it's not quite the true

1022
00:37:12,550 --> 00:37:09,440
first first-person representation

1023
00:37:15,109 --> 00:37:12,560
of of humanity's uh contact with the

1024
00:37:17,589 --> 00:37:15,119
surface of mars it is a small step in

1025
00:37:19,750 --> 00:37:17,599
that regard it's it's an opportunity to

1026
00:37:22,470 --> 00:37:19,760
extend the human presence

1027
00:37:24,710 --> 00:37:22,480
uh virtually in some small piece out

1028
00:37:27,430 --> 00:37:24,720
beyond our own world and have that

1029
00:37:29,430 --> 00:37:27,440
represent the eventual human mission to

1030
00:37:31,109 --> 00:37:29,440
mars that will be the follow-on to the

1031
00:37:33,670 --> 00:37:31,119
robotic precursors measures that we're

1032
00:37:35,270 --> 00:37:33,680
doing right now

1033
00:37:37,829 --> 00:37:35,280
all right before we go to our next

1034
00:37:39,750 --> 00:37:37,839
question i understand we have yet

1035
00:37:46,310 --> 00:37:39,760
another image and possibly a couple of

1036
00:37:49,190 --> 00:37:47,910
john do you have anything you wanted to

1037
00:37:52,069 --> 00:37:49,200
comment on

1038
00:37:53,910 --> 00:37:52,079

yeah what you see there is um

1039
00:37:54,950 --> 00:37:53,920
obviously wheel tracks crisscrossing

1040
00:37:58,550 --> 00:37:54,960
each other

1041
00:38:01,510 --> 00:37:58,560
and uh i i believe uh if you look to the

1042
00:38:04,470 --> 00:38:01,520
upper left uh that's probably close to

1043
00:38:06,790 --> 00:38:04,480
where the rover uh started out

1044
00:38:07,829 --> 00:38:06,800
and then you see tracks angling down

1045
00:38:09,430 --> 00:38:07,839
towards

1046
00:38:11,670 --> 00:38:09,440
where the wheels are now that are

1047
00:38:13,589 --> 00:38:11,680
crisscrossed

1048
00:38:17,109 --> 00:38:13,599
by the

1049
00:38:18,950 --> 00:38:17,119
and and the cool thing about it is

1050
00:38:21,030 --> 00:38:18,960
actually right where they're crossing

1051
00:38:23,510 --> 00:38:21,040
you you see the imprint

1052
00:38:25,589 --> 00:38:23,520
uh of the uh what is now known to be

1053
00:38:27,109 --> 00:38:25,599
morse code for jpl

1054
00:38:29,270 --> 00:38:27,119
and um

1055
00:38:31,910 --> 00:38:29,280
and that imprint of course is is used to

1056
00:38:33,670 --> 00:38:31,920
assess wheel slip and and that indicates

1057
00:38:35,430 --> 00:38:33,680
one revolution around the wheel every

1058
00:38:36,470 --> 00:38:35,440
time you see that thing stamped on the

1059
00:38:38,790 --> 00:38:36,480
surface

1060
00:38:41,190 --> 00:38:38,800
and so based on how closely compressed

1061
00:38:44,550 --> 00:38:41,200
those marks are gives the engineers the

1062
00:38:47,190 --> 00:38:44,560
mobility engineers a chance to assess

1063
00:38:49,829 --> 00:38:47,200

the properties of the terrain uh and in

1064
00:38:51,829 --> 00:38:49,839
terms of uh how how mobile the materials

1065
00:38:53,829 --> 00:38:51,839
are

1066
00:38:55,829 --> 00:38:53,839
okay well folks as i said this is live

1067
00:38:57,430 --> 00:38:55,839
stuff coming in so that's kind of kind

1068
00:38:59,190 --> 00:38:57,440
of fun today mount sharp in the

1069
00:39:01,829 --> 00:38:59,200
background

1070
00:39:04,069 --> 00:39:01,839
okay thank you uh next question is going

1071
00:39:05,510 --> 00:39:04,079
to be from space.com and mike wall who's

1072
00:39:07,750 --> 00:39:05,520
on the phone

1073
00:39:09,190 --> 00:39:07,760
uh hi this one's probably for for john

1074
00:39:10,630 --> 00:39:09,200
could you just give a little more detail

1075
00:39:12,630 --> 00:39:10,640
how much time do you think you guys are

1076
00:39:14,710 --> 00:39:12,640
going to spend at those scours doing

1077
00:39:16,390 --> 00:39:14,720
doing those investigations and yeah when

1078
00:39:17,910 --> 00:39:16,400
do you think that that you might head

1079
00:39:20,550 --> 00:39:17,920
off and might kind of make your first

1080
00:39:22,790 --> 00:39:20,560
big drive toward the science target

1081
00:39:26,069 --> 00:39:22,800
yeah it begins tomorrow uh tomorrow we

1082
00:39:27,990 --> 00:39:26,079
do we do a bump of mic 10 meters yeah 10

1083
00:39:30,310 --> 00:39:28,000
meters and then

1084
00:39:32,310 --> 00:39:30,320
mike will be set up to acquire the

1085
00:39:35,030 --> 00:39:32,320
second part of his data set to

1086
00:39:37,190 --> 00:39:35,040
demonstrate the technology to use long

1087
00:39:38,790 --> 00:39:37,200
baseline stereo with

1088
00:39:39,829 --> 00:39:38,800

with the mast cams which is going to be

1089
00:39:42,150 --> 00:39:39,839
terrific

1090
00:39:44,630 --> 00:39:42,160
and and then after that uh we start

1091
00:39:46,870 --> 00:39:44,640
driving and and the

1092
00:39:49,109 --> 00:39:46,880
rover engineers are really excited about

1093
00:39:51,190 --> 00:39:49,119
this the the rover planners the

1094
00:39:53,589 --> 00:39:51,200
mobility engineers the guys that drive

1095
00:39:56,390 --> 00:39:53,599
the rover and they will execute a series

1096
00:39:57,829 --> 00:39:56,400
of increasingly long drives that will

1097
00:40:00,150 --> 00:39:57,839
take us

1098
00:40:01,670 --> 00:40:00,160
in excess of 100 meters away from the

1099
00:40:03,270 --> 00:40:01,680
current location which is what we

1100
00:40:05,510 --> 00:40:03,280
estimate to be the

1101
00:40:07,910 --> 00:40:05,520
the the area that was affected by the

1102
00:40:10,390 --> 00:40:07,920
thrusters during landing and so we want

1103
00:40:11,589 --> 00:40:10,400
to get out beyond that zone of influence

1104
00:40:13,030 --> 00:40:11,599
and uh

1105
00:40:16,470 --> 00:40:13,040
and head out across the plains to the

1106
00:40:19,670 --> 00:40:17,670
i think we

1107
00:40:21,510 --> 00:40:19,680
maybe had another question here at jpl

1108
00:40:28,710 --> 00:40:21,520
let's get a mic back to emily here in

1109
00:40:32,550 --> 00:40:31,030
this is a question for paul um i'm

1110
00:40:33,910 --> 00:40:32,560
wondering when you do get a chance to

1111
00:40:35,430 --> 00:40:33,920
sniff the martian atmosphere for the

1112
00:40:37,270 --> 00:40:35,440
first time are you going to be able to

1113
00:40:38,790 --> 00:40:37,280

read from that

1114
00:40:40,390 --> 00:40:38,800
you know results measurements instantly

1115
00:40:42,069 --> 00:40:40,400
or is your instrument the kind of thing

1116
00:40:43,589 --> 00:40:42,079
where you're going to have to calibrate

1117
00:40:44,790 --> 00:40:43,599
it for a long period before you're going

1118
00:40:46,790 --> 00:40:44,800
to be able to say anything definitive

1119
00:40:49,829 --> 00:40:46,800
about the composition

1120
00:40:52,150 --> 00:40:49,839
yeah we we certainly uh calibrated the

1121
00:40:54,870 --> 00:40:52,160
instrument well before

1122
00:40:57,670 --> 00:40:54,880
we left planet earth and we we have some

1123
00:41:01,030 --> 00:40:57,680
calibration gases along so i think uh

1124
00:41:02,870 --> 00:41:01,040
you know quite rapidly we'll be able to

1125
00:41:03,910 --> 00:41:02,880
establish some of the

1126
00:41:06,150 --> 00:41:03,920
uh

1127
00:41:08,309 --> 00:41:06,160
measurements that we're interested in

1128
00:41:12,390 --> 00:41:08,319
the major composition of the atmosphere

1129
00:41:14,309 --> 00:41:12,400
was uh measured by viking and it was

1130
00:41:16,309 --> 00:41:14,319
optimized for a certain set of tasks and

1131
00:41:18,390 --> 00:41:16,319
we're very interested in in doing a

1132
00:41:20,710 --> 00:41:18,400
double check on that

1133
00:41:22,390 --> 00:41:20,720
the new capability this you know aside

1134
00:41:25,030 --> 00:41:22,400
from the chromatography and looking for

1135
00:41:26,150 --> 00:41:25,040
organics in rocks and so on which which

1136
00:41:28,230 --> 00:41:26,160
don't have anything to do with the

1137
00:41:29,910 --> 00:41:28,240
atmosphere the new capability that we

1138
00:41:32,309 --> 00:41:29,920

bring to the atmospheric measurements

1139
00:41:33,750 --> 00:41:32,319
really is the precision measurement of

1140
00:41:35,990 --> 00:41:33,760
isotopes with the tunable laser

1141
00:41:37,990 --> 00:41:36,000
spectrometer and also our search for

1142
00:41:40,309 --> 00:41:38,000
trace methane

1143
00:41:43,349 --> 00:41:40,319
obviously methane of great interest to

1144
00:41:44,950 --> 00:41:43,359
us us and and many other people

1145
00:41:46,550 --> 00:41:44,960
but

1146
00:41:47,910 --> 00:41:46,560
we're going to just be very careful and

1147
00:41:51,030 --> 00:41:47,920
look at those results and make sure we

1148
00:41:52,550 --> 00:41:51,040
understand them very very well

1149
00:41:54,470 --> 00:41:52,560
before

1150
00:41:55,829 --> 00:41:54,480
we start advertising something that we

1151
00:41:57,270 --> 00:41:55,839
may not have

1152
00:42:00,710 --> 00:41:57,280
so

1153
00:42:01,589 --> 00:42:00,720
come early and others will come a bit

1154
00:42:02,950 --> 00:42:01,599
later

1155
00:42:05,589 --> 00:42:02,960
and i'm just wondering if you can be a

1156
00:42:08,790 --> 00:42:05,599
little bit more specific about the um

1157
00:42:11,430 --> 00:42:08,800
about what caused uh sam to quit

1158
00:42:13,589 --> 00:42:11,440
an intake of mars gas yeah sure

1159
00:42:15,829 --> 00:42:13,599
so it turns out

1160
00:42:17,190 --> 00:42:15,839
we have these these miniature pumps we

1161
00:42:19,750 --> 00:42:17,200
call them wide range pumps but they're

1162
00:42:22,230 --> 00:42:19,760
really turbo molecular pumps uh on top

1163
00:42:23,750 --> 00:42:22,240

of a molecular drag stage the really

1164
00:42:25,990 --> 00:42:23,760
nice thing about these pumps is they

1165
00:42:29,670 --> 00:42:26,000
exhaust naturally right at mars pressure

1166
00:42:32,150 --> 00:42:29,680
at 10 millibar seven millibar

1167
00:42:34,950 --> 00:42:32,160
and it turns out that there's a very

1168
00:42:37,349 --> 00:42:34,960
slow leak uh into the tunable laser

1169
00:42:38,950 --> 00:42:37,359
spectrometer and so there was just a

1170
00:42:41,670 --> 00:42:38,960
little bit of residual atmosphere in

1171
00:42:43,349 --> 00:42:41,680
there and uh in in the harriet cell

1172
00:42:45,349 --> 00:42:43,359
which is a cell where the light bounces

1173
00:42:47,109 --> 00:42:45,359
back and forth to get a long path length

1174
00:42:49,750 --> 00:42:47,119
for the for the methane the carbon

1175
00:42:51,270 --> 00:42:49,760
dioxide and the water measurements

1176
00:42:53,349 --> 00:42:51,280
and so

1177
00:42:56,710 --> 00:42:53,359
the few tens of millibars that we had in

1178
00:42:58,470 --> 00:42:56,720
there i think we had 51 millibar and

1179
00:43:00,710 --> 00:42:58,480
we had assumed that the pump would be

1180
00:43:04,470 --> 00:43:00,720
fine evacuating that we routinely

1181
00:43:06,950 --> 00:43:04,480
evacuate mars ambient out of the cell uh

1182
00:43:09,030 --> 00:43:06,960
but it was just high enough that the

1183
00:43:10,390 --> 00:43:09,040
the current sensor on the pump said now

1184
00:43:12,470 --> 00:43:10,400
this is a little bit too high i'm going

1185
00:43:14,550 --> 00:43:12,480
to turn myself off and it did

1186
00:43:16,950 --> 00:43:14,560
but sam continued merrily along its

1187
00:43:19,030 --> 00:43:16,960
measurement path assuming that

1188
00:43:20,950 --> 00:43:19,040

we had not turned off

1189
00:43:22,309 --> 00:43:20,960
and so we we measured that gas with both

1190
00:43:24,870 --> 00:43:22,319
the mass spectrometer and the tunable

1191
00:43:27,270 --> 00:43:24,880
laser spectrom laser spectrometer it

1192
00:43:28,630 --> 00:43:27,280
really led to some excitement the the

1193
00:43:31,030 --> 00:43:28,640
tls team

1194
00:43:33,589 --> 00:43:31,040
uh chris and greg were their eyes were

1195
00:43:35,430 --> 00:43:33,599
wide open they saw all this methane and

1196
00:43:37,589 --> 00:43:35,440
uh

1197
00:43:40,230 --> 00:43:37,599
it turns out it was terrestrial methane

1198
00:43:42,710 --> 00:43:40,240
but it really was kind of a good test

1199
00:43:44,390 --> 00:43:42,720
because they saw that their spectral

1200
00:43:45,990 --> 00:43:44,400
range was calibrated the lines were

1201
00:43:48,710 --> 00:43:46,000
right in the middle of this very very

1202
00:43:50,309 --> 00:43:48,720
narrow bandwidth area that they scan and

1203
00:43:52,470 --> 00:43:50,319
so in the end they're they're really

1204
00:43:55,190 --> 00:43:52,480
happy i mean it's an additional piece of

1205
00:43:57,430 --> 00:43:55,200
information that that we secured with

1206
00:43:58,550 --> 00:43:57,440
this test so all in all we're not too

1207
00:44:00,230 --> 00:43:58,560
unhappy

1208
00:44:01,430 --> 00:44:00,240
okay we're going to go back to the

1209
00:44:03,030 --> 00:44:01,440
phones we have a couple people who've

1210
00:44:04,870 --> 00:44:03,040
been waiting patiently thank you for

1211
00:44:08,550 --> 00:44:04,880
that we're going to take a question from

1212
00:44:10,870 --> 00:44:08,560
ken cramer of space flight now hi thank

1213
00:44:13,190 --> 00:44:10,880

you space flight magazine uh for mike

1214
00:44:14,870 --> 00:44:13,200
malin i have a question please um can

1215
00:44:17,109 --> 00:44:14,880
you talk a little bit about the focusing

1216
00:44:17,910 --> 00:44:17,119
ability of of the cameras how much do

1217
00:44:20,390 --> 00:44:17,920
you

1218
00:44:21,510 --> 00:44:20,400
have to intervene and how much can the

1219
00:44:24,470 --> 00:44:21,520
rover

1220
00:44:25,910 --> 00:44:24,480
focus itself at these close and far

1221
00:44:27,670 --> 00:44:25,920
distances please

1222
00:44:29,829 --> 00:44:27,680
the camera has

1223
00:44:31,829 --> 00:44:29,839
auto focus each camera has its own auto

1224
00:44:32,790 --> 00:44:31,839
focus except for mardi which is fixed

1225
00:44:42,870 --> 00:44:32,800
focus

1226
00:44:45,030 --> 00:44:42,880
infinity

1227
00:44:49,510 --> 00:44:45,040
but we need to know we needed to know

1228
00:44:52,630 --> 00:44:49,520
the motor count of a facil of infinity

1229
00:44:54,950 --> 00:44:52,640
and our initial work we had set the the

1230
00:44:57,190 --> 00:44:54,960
range of where infinity ought to be to a

1231
00:44:59,670 --> 00:44:57,200
little less than it than we should have

1232
00:45:02,230 --> 00:44:59,680
and this this particular test that we

1233
00:45:05,030 --> 00:45:02,240
did in the characterization let it go if

1234
00:45:07,750 --> 00:45:05,040
you will beyond infinity and so we got

1235
00:45:09,670 --> 00:45:07,760
to the other side of the focus range and

1236
00:45:11,750 --> 00:45:09,680
then we can actually determine the the

1237
00:45:14,230 --> 00:45:11,760
actual focus position and we were

1238
00:45:16,950 --> 00:45:14,240

probably we were about 10 off in our

1239
00:45:20,230 --> 00:45:16,960
initial calibration information

1240
00:45:21,829 --> 00:45:20,240
and so and and the rover can do this uh

1241
00:45:23,750 --> 00:45:21,839
or the cameras can do this we just

1242
00:45:26,309 --> 00:45:23,760
command it auto focus

1243
00:45:28,230 --> 00:45:26,319
we tend to want to give it a seed number

1244
00:45:31,030 --> 00:45:28,240
which is as close

1245
00:45:33,030 --> 00:45:31,040
as we we think the focus may be

1246
00:45:35,349 --> 00:45:33,040
and then we scan through in one

1247
00:45:38,309 --> 00:45:35,359
direction only through that and we hope

1248
00:45:40,150 --> 00:45:38,319
to find the best focus and we fit a

1249
00:45:42,069 --> 00:45:40,160
curve to find the best focus from the

1250
00:45:43,589 --> 00:45:42,079
quality of the images that we're getting

1251
00:45:45,109 --> 00:45:43,599
during as we go through the focus

1252
00:45:46,470 --> 00:45:45,119
position

1253
00:45:49,190 --> 00:45:46,480
and that

1254
00:45:52,390 --> 00:45:49,200
that's to save motor counts because

1255
00:45:54,150 --> 00:45:52,400
these are mechanical systems and uh all

1256
00:45:56,309 --> 00:45:54,160
mechanical systems in space have a

1257
00:45:59,430 --> 00:45:56,319
finite lifetime so we don't want to use

1258
00:46:01,109 --> 00:45:59,440
a lot of mechanism motion to find the

1259
00:46:02,470 --> 00:46:01,119
focuses

1260
00:46:04,230 --> 00:46:02,480
all right we have time for a couple of

1261
00:46:06,630 --> 00:46:04,240
more quick questions lee reynolds from

1262
00:46:09,190 --> 00:46:06,640
redorbit.com

1263
00:46:11,349 --> 00:46:09,200

hi guys this question is for paul uh

1264
00:46:14,150 --> 00:46:11,359
will sam be capable of one day giving us

1265
00:46:15,829 --> 00:46:14,160
an idea of what this area of mars smells

1266
00:46:17,750 --> 00:46:15,839
like

1267
00:46:22,230 --> 00:46:17,760
of what this area of mars was filled

1268
00:46:26,550 --> 00:46:23,990
you know we're uh

1269
00:46:28,630 --> 00:46:26,560
looking for evolved sulfur compounds

1270
00:46:30,870 --> 00:46:28,640
from rocks and

1271
00:46:33,829 --> 00:46:30,880
you know depending on the most likely is

1272
00:46:36,230 --> 00:46:33,839
very oxidized it might be sulfur dioxide

1273
00:46:37,190 --> 00:46:36,240
but but you never know so i think that

1274
00:46:39,430 --> 00:46:37,200
uh

1275
00:46:41,829 --> 00:46:39,440
certainly with the variety of of

1276
00:46:43,829 --> 00:46:41,839
chemicals that we hope to

1277
00:46:45,349 --> 00:46:43,839
obtain from our evolved gas measurement

1278
00:46:46,470 --> 00:46:45,359
that may have been captured billions of

1279
00:46:49,270 --> 00:46:46,480
years ago

1280
00:46:51,109 --> 00:46:49,280
i think the answer is is certainly yes

1281
00:46:54,150 --> 00:46:51,119
all right thank you

1282
00:46:56,069 --> 00:46:54,160
okay back to jpl bill did you have a

1283
00:46:58,390 --> 00:46:56,079
question

1284
00:47:00,390 --> 00:46:58,400
in the second row there

1285
00:47:01,270 --> 00:47:00,400
is the let's give the mic to him

1286
00:47:02,550 --> 00:47:01,280
okay

1287
00:47:04,309 --> 00:47:02,560
i thought you did i just wanted to make

1288
00:47:06,150 --> 00:47:04,319

sure thank you uh

1289
00:47:08,790 --> 00:47:06,160
uh first of all congratulations again

1290
00:47:10,550 --> 00:47:08,800
everyone these are spectacular images

1291
00:47:13,510 --> 00:47:10,560
but i was just wondering this question

1292
00:47:15,750 --> 00:47:13,520
of methane is uh a deep one

1293
00:47:17,190 --> 00:47:15,760
is it isotopically different the sample

1294
00:47:19,430 --> 00:47:17,200
you took with you than what you're going

1295
00:47:20,790 --> 00:47:19,440
to be smelling for

1296
00:47:23,589 --> 00:47:20,800
like you're looking for a different

1297
00:47:24,390 --> 00:47:23,599
isotope of methane

1298
00:47:32,150 --> 00:47:24,400
uh

1299
00:47:35,349 --> 00:47:32,160
difficult because the predicts are kind

1300
00:47:36,470 --> 00:47:35,359
of on the order of parts per billion

1301
00:47:37,750 --> 00:47:36,480
and uh

1302
00:47:39,589 --> 00:47:37,760
you know there's some measurements from

1303
00:47:41,030 --> 00:47:39,599
mars orbit there are some ground-based

1304
00:47:41,990 --> 00:47:41,040
measurements which are very difficult

1305
00:47:43,430 --> 00:47:42,000
because you're looking through the

1306
00:47:45,510 --> 00:47:43,440
earth's atmosphere and have to do all

1307
00:47:47,589 --> 00:47:45,520
sorts of correction but nevertheless

1308
00:47:48,549 --> 00:47:47,599
these numbers are very very low

1309
00:47:50,790 --> 00:47:48,559
uh

1310
00:47:53,910 --> 00:47:50,800
they're they're on the predictions the

1311
00:47:55,430 --> 00:47:53,920
observations which we'd like to confirm

1312
00:47:57,589 --> 00:47:55,440
uh or not

1313
00:47:59,430 --> 00:47:57,599

are on the order of several parts per

1314
00:48:01,829 --> 00:47:59,440
billion and so with our direct

1315
00:48:04,069 --> 00:48:01,839
measurements we uh

1316
00:48:06,390 --> 00:48:04,079
hope to secure that answer but the

1317
00:48:08,870 --> 00:48:06,400
isotope measurement

1318
00:48:10,950 --> 00:48:08,880
of carbon 13 to carbon 12 for example

1319
00:48:12,950 --> 00:48:10,960
which is the next thing you want to do

1320
00:48:15,349 --> 00:48:12,960
we won't do unless we have several tens

1321
00:48:16,630 --> 00:48:15,359
of parts per billion in the atmosphere

1322
00:48:18,870 --> 00:48:16,640
directly

1323
00:48:21,910 --> 00:48:18,880
what we have long term is a plan to

1324
00:48:24,069 --> 00:48:21,920
really pump up the methane in the tls

1325
00:48:26,150 --> 00:48:24,079
using chemical separation in our gas

1326
00:48:28,470 --> 00:48:26,160
processing system so that's something

1327
00:48:30,390 --> 00:48:28,480
that over a period of months we'll be

1328
00:48:32,309 --> 00:48:30,400
testing out in our test bed at goddard

1329
00:48:34,549 --> 00:48:32,319
which is a sam just like the one that's

1330
00:48:37,510 --> 00:48:34,559
roving across mars and anything we want

1331
00:48:40,230 --> 00:48:37,520
to do on flight sam on mars we do on the

1332
00:48:42,230 --> 00:48:40,240
test bed first to validate it and so

1333
00:48:43,750 --> 00:48:42,240
even if we only have a few parts per

1334
00:48:45,829 --> 00:48:43,760
billion we'll hope we'll be hoping

1335
00:48:47,430 --> 00:48:45,839
eventually to get the the isotope

1336
00:48:49,430 --> 00:48:47,440
numbers so

1337
00:48:52,150 --> 00:48:49,440
can we compare that to what was possible

1338
00:48:52,870 --> 00:48:52,160

with the instruments on viking or is it

1339
00:48:55,270 --> 00:48:52,880
yeah

1340
00:48:56,870 --> 00:48:55,280
we certainly can and and that's really

1341
00:48:58,870 --> 00:48:56,880
one reason for the tunable laser

1342
00:49:00,710 --> 00:48:58,880
spectrometer it turns out that in the

1343
00:49:04,230 --> 00:49:00,720
mass spectrometer you have a hot

1344
00:49:07,589 --> 00:49:04,240
filament and just the

1345
00:49:08,870 --> 00:49:07,599
diffusion of gases out of the hot metals

1346
00:49:11,349 --> 00:49:08,880
tend to make just a little bit of

1347
00:49:13,750 --> 00:49:11,359
methane so it's very very difficult with

1348
00:49:15,750 --> 00:49:13,760
a mass spectrometer directly at those

1349
00:49:18,150 --> 00:49:15,760
levels unless you're using some

1350
00:49:19,750 --> 00:49:18,160
enrichment technique if it's much higher

1351
00:49:21,829 --> 00:49:19,760
it's no problem we went to jupiter with

1352
00:49:24,309 --> 00:49:21,839
galileo probe and found methane no

1353
00:49:26,069 --> 00:49:24,319
problem but it's very abundant uh but at

1354
00:49:28,150 --> 00:49:26,079
mars that's exactly the reason we have

1355
00:49:30,150 --> 00:49:28,160
the tunable laser spectrometer that

1356
00:49:32,870 --> 00:49:30,160
chris webster and his team developed

1357
00:49:35,270 --> 00:49:32,880
okay and i we have time for one final

1358
00:49:36,870 --> 00:49:35,280
question leo and right back to irish tv

1359
00:49:39,270 --> 00:49:36,880
but can you please keep your question

1360
00:49:40,950 --> 00:49:39,280
really brief so we don't run over

1361
00:49:43,190 --> 00:49:40,960
thanks jane i appreciate this just i'm

1362
00:49:46,150 --> 00:49:43,200
looking for a sound bite really

1363
00:49:48,549 --> 00:49:46,160

it's it's late at night in europe late

1364
00:49:51,270 --> 00:49:48,559
at night on mars when it's morning in

1365
00:49:53,910 --> 00:49:51,280
ireland it will be morning at gale

1366
00:49:56,390 --> 00:49:53,920
crater and i'd like somebody to be a

1367
00:49:58,390 --> 00:49:56,400
little bit poetic and tell me for our

1368
00:50:01,430 --> 00:49:58,400
breakfast television audience

1369
00:50:03,030 --> 00:50:01,440
what will morning look like on gale

1370
00:50:04,630 --> 00:50:03,040
crater now that we've seen these

1371
00:50:10,390 --> 00:50:04,640
wonderful pictures that you presented

1372
00:50:19,349 --> 00:50:13,349
you're the poet john no pressure

1373
00:50:25,829 --> 00:50:21,829
we're not poets yeah i

1374
00:50:28,390 --> 00:50:25,839
i think uh you know the the first light

1375
00:50:31,270 --> 00:50:28,400
image at at this particular place is

1376
00:50:33,670 --> 00:50:31,280
just it's it's going to be inspiring uh

1377
00:50:35,430 --> 00:50:33,680
it's the we've wondered about this place

1378
00:50:36,710 --> 00:50:35,440
for years from orbit

1379
00:50:39,510 --> 00:50:36,720
and uh

1380
00:50:42,069 --> 00:50:39,520
and that this image is basically looking

1381
00:50:45,670 --> 00:50:42,079
what direction mike well south south

1382
00:50:48,069 --> 00:50:45,680
east south southwest yeah south west

1383
00:50:50,790 --> 00:50:48,079
um it'll it'll look uh shadowy and

1384
00:50:54,950 --> 00:50:52,710
okay thank you very much everybody oh

1385
00:50:57,109 --> 00:50:54,960
i'm sorry did somebody just the the one

1386
00:50:59,270 --> 00:50:57,119
thing maybe you could add to that given

1387
00:51:01,430 --> 00:50:59,280
the the first measurements from sam the

1388
00:51:03,190 --> 00:51:01,440

the images that we have in the audio

1389
00:51:05,430 --> 00:51:03,200
files that we have is the first time we

1390
00:51:08,150 --> 00:51:05,440
have the sounds the sights and the

1391
00:51:09,190 --> 00:51:08,160
smells of mars

1392
00:51:10,470 --> 00:51:09,200
good

1393
00:51:12,790 --> 00:51:10,480
all right on that note we're going to

1394
00:51:14,470 --> 00:51:12,800
wrap up today's news conference and a

1395
00:51:16,470 --> 00:51:14,480
reminder that if you stay tuned we will

1396
00:51:17,510 --> 00:51:16,480
be replaying the visuals that you saw

1397
00:51:19,349 --> 00:51:17,520
today

1398
00:51:25,069 --> 00:51:19,359
and there's lots of information and

1399
00:51:25,079 --> 00:51:43,990
msl thanks for joining us today

1400
00:51:48,549 --> 00:51:46,630
hello this is charlie bolden nasa

1401
00:51:50,790 --> 00:51:48,559
administrator speaking to you via the

1402
00:51:53,430 --> 00:51:50,800
broadcast capabilities of the curiosity

1403
00:51:54,870 --> 00:51:53,440
rover which is now on the surface of

1404
00:51:57,109 --> 00:51:54,880
mars

1405
00:51:59,990 --> 00:51:57,119
since the beginning of time humankind's

1406
00:52:01,109 --> 00:52:00,000
curiosity has led us to constantly seek

1407
00:52:03,030 --> 00:52:01,119
new life

1408
00:52:04,549 --> 00:52:03,040
new possibilities just beyond the

1409
00:52:06,549 --> 00:52:04,559
horizon

1410
00:52:08,630 --> 00:52:06,559
i want to congratulate the men and women

1411
00:52:10,710 --> 00:52:08,640
of our nasa family as well as our

1412
00:52:13,349 --> 00:52:10,720
commercial and government partners

1413
00:52:15,510 --> 00:52:13,359

around the world for taking us a step

1414
00:52:17,910 --> 00:52:15,520
beyond to mars

1415
00:52:20,710 --> 00:52:17,920
this is an extraordinary achievement

1416
00:52:22,150 --> 00:52:20,720
landing a rover on mars is not easy

1417
00:52:24,790 --> 00:52:22,160
others have tried

1418
00:52:26,790 --> 00:52:24,800
only america has fully succeeded

1419
00:52:28,630 --> 00:52:26,800
the investment we are making

1420
00:52:31,510 --> 00:52:28,640
the knowledge we hope to gain from our

1421
00:52:33,510 --> 00:52:31,520
observation and analysis of gale crater

1422
00:52:36,309 --> 00:52:33,520
will tell us much about the possibility

1423
00:52:39,829 --> 00:52:36,319
of life on mars as well as the past and

1424
00:52:41,990 --> 00:52:39,839
future possibilities of our own planet

1425
00:52:43,829 --> 00:52:42,000
curiosity will bring benefits to earth

1426
00:52:46,790 --> 00:52:43,839
and inspire a new generation of

1427
00:52:49,750 --> 00:52:46,800
scientists and explorers as it prepares

1428
00:52:51,510 --> 00:52:49,760
the way for a human mission in the not

1429
00:53:55,829 --> 00:52:51,520
too distant future