1
00:00:07,220 --> 00:00:05,390
when you go to another planet there's

2
00:00:09,259 --> 00:00:07,230
just so much potential for making brand

3
00:00:10,759 --> 00:00:09,269
new discoveries my name is Katie stack

4
00:00:13,039 --> 00:00:10,769
Morgan and I study rocks on other

5
00:00:14,660 --> 00:00:13,049
planets the Mars 2020 will be seeking

6
00:00:16,730 --> 00:00:14,670
signs of ancient life in the rock record

7
00:00:18,109 --> 00:00:16,740
of Mars the instruments are really well

8
00:00:20,060 --> 00:00:18,119
suited to look for things that we call

9
00:00:21,349 --> 00:00:20,070
bio signatures which are signs that

10
00:00:24,200 --> 00:00:21,359
ancient life might have been there in

11
00:00:26,269 --> 00:00:24,210
the past to really confirm that life had

12
00:00:27,980 --> 00:00:26,279
a hand in creating those signatures or

13
00:00:29,029 --> 00:00:27,990

textures we really do need to bring

14
00:00:30,980 --> 00:00:29,039
those samples back

15
00:00:32,780 --> 00:00:30,990
we have capabilities and laboratories

16
00:00:34,700 --> 00:00:32,790
here on earth that we can't fit in a

17
00:00:35,870 --> 00:00:34,710
compact instrument on a rover this is

18
00:00:37,580 --> 00:00:35,880
the Mars yard and this is where our

19
00:00:39,650 --> 00:00:37,590
Rovers practice driving over rocky

20
00:00:41,240 --> 00:00:39,660
terrain we work together with the

21
00:00:43,280 --> 00:00:41,250
engineers to understand what type of

22
00:00:44,690 --> 00:00:43,290
terrain the rover can handle that we can

23
00:00:46,520 --> 00:00:44,700
get to the most exciting places which

24
00:00:48,650 --> 00:00:46,530
are often the most challenging our

25
00:00:50,150 --> 00:00:48,660
landing site for Mars 2020 is jezero

26
00:00:52,069 --> 00:00:50,160
crater what's really exciting about

27
00:00:54,170 --> 00:00:52,079
jezero is that it has a beautifully

28
00:00:55,939 --> 00:00:54,180
preserved Delta they tend to be a really

29
00:00:57,889 --> 00:00:55,949
good place to preserve evidence of past

30
00:00:59,810 --> 00:00:57,899
life and we look for things like organic

31
00:01:01,549 --> 00:00:59,820
matter that get concentrated in the

32
00:01:03,290 --> 00:01:01,559
rocks of a delta so this rock is a

33
00:01:05,210 --> 00:01:03,300
sandstone not unlike a rock that we

34
00:01:06,830 --> 00:01:05,220
might actually find in jezero crater we

35
00:01:08,570 --> 00:01:06,840
would be interested in sampling a rock

36
00:01:10,160 --> 00:01:08,580
like this to understand what each

37
00:01:12,649 --> 00:01:10,170
individual sand grain has to tell us

38
00:01:14,539 --> 00:01:12,659

about Mars and its evolution growing up

39
00:01:16,550 --> 00:01:14,549
as a kid we used to go on lots of hikes

40
00:01:18,109 --> 00:01:16,560
and would visit national parks for

41
00:01:19,700 --> 00:01:18,119
summer vacations so when I found out

42
00:01:21,740 --> 00:01:19,710
that I had the opportunity to combine

43
00:01:23,870 --> 00:01:21,750
geology and love with the outdoors with

44
00:01:24,830 --> 00:01:23,880
exploring rocks on another planet I

45
00:01:26,420 --> 00:01:24,840
thought you know this is really the

46
00:01:27,649 --> 00:01:26,430
perfect type of thing for me to do not

47
00:01:29,450 --> 00:01:27,659
only could I work on an interesting

48
00:01:31,039 --> 00:01:29,460
science project but I could do it with a

49
00:01:32,899 --> 00:01:31,049
big team of people all working together

50
00:01:38,960 --> 00:01:32,909
with a focus goal and I thought that's

51
00:01:41,060 --> 00:01:38,970
what I want to do I'm marina Jericho

52
00:01:44,690 --> 00:01:41,070
with NASA's Jet Propulsion Laboratory

53
00:01:47,420 --> 00:01:44,700
JPL is where the Mars 2020 mission and

54
00:01:49,760 --> 00:01:47,430
perseverance rover are managed getting

55
00:01:53,090 --> 00:01:49,770
to Mars is a test of perseverance in

56
00:01:55,460 --> 00:01:53,100
itself there are so many incredible

57
00:01:57,649 --> 00:01:55,470
stories from the thousands of people who

58
00:02:00,230 --> 00:01:57,659
are a part of the mission today we are

59
00:02:03,109 --> 00:02:00,240
with one of the many faces behind the

60
00:02:05,660 --> 00:02:03,119
spacecraft Mars 2020 deputy project

61
00:02:08,900 --> 00:02:05,670
scientist katie stack morgan is hoping

62
00:02:09,770 --> 00:02:08,910
to find the signs of ancient life on the

63
00:02:11,510 --> 00:02:09,780

64
00:02:11,850 --> 00:02:11,520
she joins us live to answer some

65
00:02:17,280 --> 00:02:11,860
questions

66
00:02:18,870 --> 00:02:17,290
the hashtag ask NASA in light of the

67
00:02:21,630 --> 00:02:18,880
times I am talking to Katie

68
00:02:25,200 --> 00:02:21,640
across the miles in our homes as we are

69
00:02:28,260 --> 00:02:25,210
social distancing welcome Katie thanks

70
00:02:30,360 --> 00:02:28,270
marina I'm so glad to be here today well

71
00:02:32,790 --> 00:02:30,370
thank you so much for joining us now

72
00:02:35,540 --> 00:02:32,800
what exactly does a deputy project

73
00:02:39,300 --> 00:02:35,550
scientist do with the Mars 2020 mission

74
00:02:41,700 --> 00:02:39,310
so the Mars 2020 team has hundreds of

75
00:02:43,560 --> 00:02:41,710
team members including included in that

76
00:02:45,270 --> 00:02:43,570
are three hundred and fifty scientists

77
00:02:47,010 --> 00:02:45,280
both at JPL and around the world

78
00:02:48,720 --> 00:02:47,020
and as a deputy project scientist

79
00:02:50,460 --> 00:02:48,730
together with the project scientist and

80
00:02:53,490 --> 00:02:50,470
a fellow deputy where the science

81
00:02:55,710 --> 00:02:53,500
leadership for those 350 scientists and

82
00:02:57,660 --> 00:02:55,720
so during the course of the missions

83
00:02:59,340 --> 00:02:57,670
development we represent the science

84
00:03:01,260 --> 00:02:59,350
objectives as they're building the rover

85
00:03:03,330 --> 00:03:01,270
and once we land on the surface we leave

86
00:03:04,949 --> 00:03:03,340
the science team in the science mission

87
00:03:06,870 --> 00:03:04,959
helping to make decisions for what we do

88
00:03:10,050 --> 00:03:06,880

with the rover on Mars and and how we

89
00:03:11,699 --> 00:03:10,060
how we do the exciting things that we we

90
00:03:15,420 --> 00:03:11,709
hope to do on the surface of Mars with

91
00:03:17,610 --> 00:03:15,430
perseverance and exciting it is for sure

92
00:03:19,860 --> 00:03:17,620
Katie now how did you get where you are

93
00:03:24,210 --> 00:03:19,870
today and what did you study in school

94
00:03:26,250 --> 00:03:24,220
and what jobs led to this one yeah so in

95
00:03:28,470 --> 00:03:26,260
college I I knew I wanted to be a

96
00:03:30,300 --> 00:03:28,480
scientist I didn't know which kind of

97
00:03:32,490 --> 00:03:30,310
science I wanted to go into it first and

98
00:03:34,050 --> 00:03:32,500
I started in in astrophysics and

99
00:03:36,270 --> 00:03:34,060
astronomy and I was always interested in

100
00:03:38,850 --> 00:03:36,280
space but I had the great fortune of

101
00:03:41,190 --> 00:03:38,860
taking a planetary geology class so

102
00:03:43,080 --> 00:03:41,200
geology of other planets and I and I

103
00:03:45,300 --> 00:03:43,090
just loved it and so I started taking

104
00:03:47,900 --> 00:03:45,310
more geology classes and chemistry and

105
00:03:50,729 --> 00:03:47,910
math in preparation for being a

106
00:03:52,650 --> 00:03:50,739
planetary geologist but I also took a

107
00:03:54,870 --> 00:03:52,660
lot of history classes and I think that

108
00:03:56,640 --> 00:03:54,880
really contributed to my fascination

109
00:03:58,830 --> 00:03:56,650
with the history and the story of

110
00:04:00,540 --> 00:03:58,840
planets and how they evolved and so it

111
00:04:01,979 --> 00:04:00,550
was a combination of that kind of

112
00:04:04,860 --> 00:04:01,989
background that I think really prepared

113
00:04:06,630 --> 00:04:04,870

me to go into a role like this and I

114
00:04:08,070 --> 00:04:06,640
started off on the curiosity the Mars

115
00:04:11,280 --> 00:04:08,080
Science Laboratory Curiosity rover

116
00:04:13,620 --> 00:04:11,290
mission it had just a great time on that

117
00:04:16,199 --> 00:04:13,630
mission and that continues today and

118
00:04:18,599 --> 00:04:16,209
that led into this job here on the

119
00:04:21,360 --> 00:04:18,609
perseverance rover team and I'm really

120
00:04:24,990 --> 00:04:21,370
excited to to lead this team and and to

121
00:04:28,470 --> 00:04:26,730
like you said rocks have a history and

122
00:04:30,060 --> 00:04:28,480
they tell their own story and that's

123
00:04:31,700 --> 00:04:30,070
what you're going to hope to find out

124
00:04:34,380 --> 00:04:31,710
now the Rover was recently named

125
00:04:37,200 --> 00:04:34,390
perseverance what does that name mean to

126
00:04:38,870 --> 00:04:37,210
you personally you know I think that

127
00:04:41,760 --> 00:04:38,880
name was such an appropriate name for

128
00:04:44,370 --> 00:04:41,770
the Mars 2020 Rover which is the the

129
00:04:46,410 --> 00:04:44,380
first step in a possible international

130
00:04:48,630 --> 00:04:46,420
sample return effort to bring samples

131
00:04:50,370 --> 00:04:48,640
from Mars back to earth you know usually

132
00:04:52,350 --> 00:04:50,380
when we send spacecraft to Mars it's

133
00:04:55,140 --> 00:04:52,360
it's one Rover or one lander at a time

134
00:04:57,000 --> 00:04:55,150
and in that that's the mission but with

135
00:04:59,310 --> 00:04:57,010
with perseverance and and this future

136
00:05:02,520 --> 00:04:59,320
sample return campaign it's it's

137
00:05:05,250 --> 00:05:02,530
multiple missions over over several many

138
00:05:07,110 --> 00:05:05,260

years and with international

139
00:05:09,180 --> 00:05:07,120
participation and we're gonna need

140
00:05:11,310 --> 00:05:09,190
perseverance to to get those samples

141
00:05:13,260 --> 00:05:11,320
back here to earth and so I think that

142
00:05:16,110 --> 00:05:13,270
name is a good reminder even though Mars

143
00:05:17,610 --> 00:05:16,120
2020 is that first step of the journey

144
00:05:21,180 --> 00:05:17,620
that we have ahead of us and the

145
00:05:22,590 --> 00:05:21,190
challenges to ultimately succeed in our

146
00:05:24,780 --> 00:05:22,600
science objectives of bringing those

147
00:05:26,760 --> 00:05:24,790
samples back and so we're looking

148
00:05:29,010 --> 00:05:26,770
forward to that and the name of this

149
00:05:30,810 --> 00:05:29,020
Rover serves as a great reminder for

150
00:05:33,330 --> 00:05:30,820
what we have ahead and and to help keep

151
00:05:36,270 --> 00:05:33,340
us motivated to keep to keep going to

152
00:05:37,980 --> 00:05:36,280
reach that ultimate objective and I know

153
00:05:39,870 --> 00:05:37,990
there's so many of us who just can't

154
00:05:42,360 --> 00:05:39,880
wait to go on this journey with you and

155
00:05:46,050 --> 00:05:42,370
the team K T now perseverance is landing

156
00:05:47,760 --> 00:05:46,060
on Mars at jezero crater why is it that

157
00:05:51,180 --> 00:05:47,770
you and the team chose this particular

158
00:05:53,190 --> 00:05:51,190
area so there are a lot of craters on

159
00:05:55,680 --> 00:05:53,200
Mars and we visited other craters on

160
00:05:57,000 --> 00:05:55,690
Mars with previous Rovers but jezero is

161
00:06:00,000 --> 00:05:57,010
special for a couple of different

162
00:06:03,300 --> 00:06:00,010
reasons for one it's on the edge of one

163
00:06:05,520 --> 00:06:03,310

of the most the most the largest and and

164
00:06:08,490 --> 00:06:05,530
oldest impact basins on the surface of

165
00:06:10,680 --> 00:06:08,500
Mars and so the rocks that we have

166
00:06:12,960 --> 00:06:10,690
exposed in jezero crater really give us

167
00:06:15,060 --> 00:06:12,970
that that went to the earliest time in

168
00:06:16,830 --> 00:06:15,070
Mars's history when we think life had

169
00:06:20,010 --> 00:06:16,840
the best chance of existing at the

170
00:06:21,719 --> 00:06:20,020
surface and and so that that's exciting

171
00:06:23,700 --> 00:06:21,729
in and of itself in and the potential to

172
00:06:27,360 --> 00:06:23,710
bring those rocks back to earth to study

173
00:06:29,370 --> 00:06:27,370
is just a Fant fantastic potential but

174
00:06:32,100 --> 00:06:29,380
jezzer is also special because we know

175
00:06:34,320 --> 00:06:32,110
slam dunk that it had water in that

176
00:06:36,029 --> 00:06:34,330
crater and that's not something we need

177
00:06:38,490 --> 00:06:36,039
necessarily know for all the craters on

178
00:06:40,950 --> 00:06:38,500
Mars but it has the beautifully proves

179
00:06:42,540 --> 00:06:40,960
of Delta and an inlet channel and an

180
00:06:43,980 --> 00:06:42,550
outlet channel so we know that that

181
00:06:45,720 --> 00:06:43,990
crater basically filled up like a

182
00:06:48,960 --> 00:06:45,730
bathtub at some point in the ancient

183
00:06:51,030 --> 00:06:48,970
ancient past and and overflowed at some

184
00:06:53,370 --> 00:06:51,040
point so what we have in jezero crater

185
00:06:55,830 --> 00:06:53,380
are these ancient rocks representing

186
00:06:57,900 --> 00:06:55,840
earliest earliest Mars history we have

187
00:06:59,670 --> 00:06:57,910
rocks that were deposited in an ancient

188
00:07:01,800 --> 00:06:59,680

lake which we know from Earth are a

189
00:07:04,380 --> 00:07:01,810
great place to search for for signs of

190
00:07:06,270 --> 00:07:04,390
life and you know if things go well

191
00:07:08,160 --> 00:07:06,280
we'll have an opportunity to answer some

192
00:07:10,110 --> 00:07:08,170
of our most fundamental questions we

193
00:07:12,750 --> 00:07:10,120
have about Mars history and planetary

194
00:07:15,180 --> 00:07:12,760
evolution in addition to continuing our

195
00:07:18,420 --> 00:07:15,190
search for life on on Mars and and

196
00:07:20,850 --> 00:07:18,430
elsewhere in the solar system the

197
00:07:23,280 --> 00:07:20,860
pictures are just incredible of jezero

198
00:07:25,620 --> 00:07:23,290
crater it's it's so neat to look at that

199
00:07:27,630 --> 00:07:25,630
and I'm sure you're super excited to be

200
00:07:30,510 --> 00:07:27,640
a part of this mission how are you gonna

201
00:07:34,050 --> 00:07:30,520
feel next year on February 18th when it

202
00:07:35,940 --> 00:07:34,060
hopefully lands well you know I think

203
00:07:38,550 --> 00:07:35,950
there are a lot of nerves associated

204
00:07:40,440 --> 00:07:38,560
with with launches and landing events so

205
00:07:41,909 --> 00:07:40,450
will certainly be on me I'll be on the

206
00:07:43,650 --> 00:07:41,919
edge of my seat

207
00:07:45,510 --> 00:07:43,660
but you know there's nothing quite like

208
00:07:47,100 --> 00:07:45,520
getting that first image back from the

209
00:07:48,540 --> 00:07:47,110
surface of Mars and that's an experience

210
00:07:50,400 --> 00:07:48,550
that I was really lucky to have as a

211
00:07:52,770 --> 00:07:50,410
member of the Curiosity rover team and

212
00:07:55,290 --> 00:07:52,780
so I can't wait to get that first view

213
00:07:57,900 --> 00:07:55,300

in jezero crater you know the past

214
00:08:00,210 --> 00:07:57,910
couple of years I've spent hundreds of

215
00:08:02,700 --> 00:08:00,220
hours looking at these images from from

216
00:08:04,950 --> 00:08:02,710
our orbiter cameras so that opportunity

217
00:08:07,260 --> 00:08:04,960
to translate what we see from orbit to

218
00:08:09,960 --> 00:08:07,270
then what we see on the surface is just

219
00:08:12,570 --> 00:08:09,970
a great moment for me as a scientist and

220
00:08:14,219 --> 00:08:12,580
so I'm really excited for that and we

221
00:08:16,350 --> 00:08:14,229
have we have a lot of work to do on the

222
00:08:18,409 --> 00:08:16,360
surface cashing those samples and

223
00:08:20,550 --> 00:08:18,419
getting ready for Mars sample return so

224
00:08:23,880 --> 00:08:20,560
we're I'll be ready to hit the ground

225
00:08:25,530 --> 00:08:23,890
running and excited for making those

226
00:08:27,330 --> 00:08:25,540
scientific discoveries that we think are

227
00:08:29,580 --> 00:08:27,340
really going to advance Mars science and

228
00:08:33,089 --> 00:08:29,590
our understanding of the solar system

229
00:08:36,329 --> 00:08:33,099
and how it evolved that is going to be

230
00:08:38,370 --> 00:08:36,339
really awesome Katey and as you folks

231
00:08:42,089 --> 00:08:38,380
might not know at home the launch window

232
00:08:44,460 --> 00:08:42,099
for Mars 2020 mission opens up July 17th

233
00:08:46,110 --> 00:08:44,470
and that's down at Kennedy Space Center

234
00:08:48,240 --> 00:08:46,120
and so we'll be keeping our fingers

235
00:08:50,260 --> 00:08:48,250
crossed for a very successful launch now

236
00:08:52,480 --> 00:08:50,270
I'd like to welcome Stephanie Smith

237
00:08:55,090 --> 00:08:52,490
social media manager to answer all of

238
00:08:58,150 --> 00:08:55,100

your questions coming in for Katy

239
00:08:59,560 --> 00:08:58,160
welcome Stephanie well I'm certainly

240
00:09:01,690 --> 00:08:59,570
looking out for all of those questions

241
00:09:04,240 --> 00:09:01,700
but we're gonna let Katy answer them

242
00:09:05,650 --> 00:09:04,250
we're seeing lots of great chat we've

243
00:09:08,610 --> 00:09:05,660
got people from around the world

244
00:09:12,450 --> 00:09:08,620
watching live right now India Jamaica

245
00:09:16,270 --> 00:09:12,460
Germany right here in Pasadena home to

246
00:09:19,210 --> 00:09:16,280
our laboratory and our Mars rovers

247
00:09:20,680 --> 00:09:19,220
anyway without any further ado if you're

248
00:09:22,510 --> 00:09:20,690
watching this on youtube and you don't

249
00:09:24,010 --> 00:09:22,520
see that chat just go ahead and refresh

250
00:09:26,410 --> 00:09:24,020
your browser because the chat window is

251
00:09:29,500 --> 00:09:26,420
open we'll be taking your questions from

252
00:09:32,140 --> 00:09:29,510
there as well as monitoring Twitter for

253
00:09:35,800 --> 00:09:32,150
the hashtag ask NASA without any further

254
00:09:38,760 --> 00:09:35,810
ado Katie we're getting all kinds of

255
00:09:40,360 --> 00:09:38,770
different questions including one about

256
00:09:41,830 --> 00:09:40,370
moxie

257
00:09:44,910 --> 00:09:41,840
we know Moxie is a technology

258
00:09:49,080 --> 00:09:44,920
demonstration on the rover but Saverio

259
00:09:53,710 --> 00:09:49,090
would like to know how does moxie work

260
00:09:55,090 --> 00:09:53,720
yes so Moxie is is like a fuel cell run

261
00:09:57,760 --> 00:09:55,100
in Reverse and you might be familiar

262
00:09:58,930 --> 00:09:57,770
with that from-from kind of the hybrid

263
00:10:01,540 --> 00:09:58,940

cars we have here on earth

264
00:10:04,140 --> 00:10:01,550
but basically what happens with moxie is

265
00:10:06,780 --> 00:10:04,150
we take co2 from the Martian atmosphere

266
00:10:09,160 --> 00:10:06,790
bring it into moxie and then through

267
00:10:11,920 --> 00:10:09,170
electrochemical processes we basically

268
00:10:14,020 --> 00:10:11,930
run electricity through the co2 molecule

269
00:10:17,080 --> 00:10:14,030
and split that into the carbon and

270
00:10:20,980 --> 00:10:17,090
oxygen and by doing that process we're

271
00:10:23,260 --> 00:10:20,990
able to produce oxygen and then that you

272
00:10:25,570 --> 00:10:23,270
know goes back out into the Martian

273
00:10:27,580 --> 00:10:25,580
Martian atmosphere an environment in

274
00:10:29,860 --> 00:10:27,590
terms of what Moxie does but our hope in

275
00:10:32,020 --> 00:10:29,870
the future and the reason why moxie is

276
00:10:33,610 --> 00:10:32,030
is a part of the Mars 2020 payload is

277
00:10:37,330 --> 00:10:33,620
that we'd like to demonstrate the

278
00:10:38,860 --> 00:10:37,340
production of oxygen in situ on Mars for

279
00:10:40,150 --> 00:10:38,870
the potential for future missions to

280
00:10:43,600 --> 00:10:40,160
take advantage of that in particular

281
00:10:46,630 --> 00:10:43,610
human exploration mission opportunities

282
00:10:49,240 --> 00:10:46,640
that would need to use oxygen on the

283
00:10:51,490 --> 00:10:49,250
surface either for you know for keeping

284
00:10:53,710 --> 00:10:51,500
their their habitable environments going

285
00:10:55,930 --> 00:10:53,720
as well as producing fuel that might get

286
00:10:57,790 --> 00:10:55,940
astronauts from the surface of Mars back

287
00:10:59,680 --> 00:10:57,800
to earth and so we're excited about that

288
00:11:01,750 --> 00:10:59,690

technology demonstration and and

289
00:11:03,970 --> 00:11:01,760
demonstrating that capability on Mars

290
00:11:07,360 --> 00:11:03,980
for the first time

291
00:11:09,640 --> 00:11:07,370
fantastic all right Heidi on YouTube

292
00:11:13,870 --> 00:11:09,650
wants to know will the rover look for

293
00:11:16,420 --> 00:11:13,880
water yes that's a great question and we

294
00:11:18,370 --> 00:11:16,430
we will indeed search for for water but

295
00:11:20,050 --> 00:11:18,380
it's not it's not necessarily searching

296
00:11:22,930 --> 00:11:20,060
for water that is liquid on the surface

297
00:11:25,150 --> 00:11:22,940
of Mars today the surface of Mars isn't

298
00:11:26,620 --> 00:11:25,160
capable of supporting liquid water it's

299
00:11:29,050 --> 00:11:26,630
the pressure is too low and it's too

300
00:11:31,930 --> 00:11:29,060
cold but we're looking for water and

301
00:11:33,520 --> 00:11:31,940
other ways and for example minerals

302
00:11:35,770 --> 00:11:33,530
which are what rocks are made of can

303
00:11:37,810 --> 00:11:35,780
actually bind water within the structure

304
00:11:39,820 --> 00:11:37,820
of those minerals and so rocks can

305
00:11:41,800 --> 00:11:39,830
actually have water in them and those

306
00:11:43,450 --> 00:11:41,810
minerals that have water some of the

307
00:11:45,280 --> 00:11:43,460
most exciting minerals that we look for

308
00:11:47,680 --> 00:11:45,290
on the surface of Mars because they are

309
00:11:49,360 --> 00:11:47,690
also really good at at trapping and

310
00:11:50,770 --> 00:11:49,370
collecting organic matter which is one

311
00:11:52,960 --> 00:11:50,780
of the key things we look for in

312
00:11:55,210 --> 00:11:52,970
determining habitable environments in

313
00:11:57,190 --> 00:11:55,220

the ancient Mars rock record and signs

314
00:11:59,590 --> 00:11:57,200
of life and so we'll be looking for

315
00:12:01,450 --> 00:11:59,600
hydrated minerals and evidence that

316
00:12:03,250 --> 00:12:01,460
water was once there on the surface of

317
00:12:05,110 --> 00:12:03,260
Mars and so that's the way we search for

318
00:12:07,120 --> 00:12:05,120
water it's its most Junt water that

319
00:12:11,740 --> 00:12:07,130
we're looking for as opposed to liquid

320
00:12:14,530 --> 00:12:11,750
water or ice at the surface today okay

321
00:12:16,810 --> 00:12:14,540
so Pete over here on YouTube certainly

322
00:12:19,300 --> 00:12:16,820
knows a lot about this Rover and one of

323
00:12:22,000 --> 00:12:19,310
its new features it will be carrying not

324
00:12:24,340 --> 00:12:22,010
one but two microphones so as a

325
00:12:28,630 --> 00:12:24,350
scientist what do you expect to learn

326
00:12:30,520 --> 00:12:28,640
from those microphones yes so so one of

327
00:12:32,650 --> 00:12:30,530
those microphones is on the is part of

328
00:12:35,890 --> 00:12:32,660
the super cam instrument suite and so

329
00:12:38,620 --> 00:12:35,900
super cam uses a laser to shoot rocks

330
00:12:41,020 --> 00:12:38,630
and and creates a vapor when the the

331
00:12:42,760 --> 00:12:41,030
laser interacts with the rocks and then

332
00:12:45,130 --> 00:12:42,770
the spectrometer is on super cam will

333
00:12:46,870 --> 00:12:45,140
analyze that vapor and so what we're

334
00:12:49,120 --> 00:12:46,880
gonna have for Mars 2020 for the first

335
00:12:53,470 --> 00:12:49,130
time is a microphone that it basically

336
00:12:56,140 --> 00:12:53,480
is able to hear that zap and go and and

337
00:12:58,960 --> 00:12:56,150
so that'll tell us a perhaps about the

338
00:13:00,790 --> 00:12:58,970

the material properties of the the rocks

339
00:13:02,950 --> 00:13:00,800
that we are in fact analyzing with the

340
00:13:05,050 --> 00:13:02,960
super cam laser so we're interested to

341
00:13:06,970 --> 00:13:05,060
know more about the the interaction of

342
00:13:09,190 --> 00:13:06,980
the super cam instrument with the

343
00:13:10,900 --> 00:13:09,200
surface of Mars and hope to be able to

344
00:13:15,269 --> 00:13:10,910
understand more about the rocks that we

345
00:13:21,790 --> 00:13:18,939
so shellin on YouTube would like to know

346
00:13:23,439 --> 00:13:21,800
how does all this data all these images

347
00:13:25,420 --> 00:13:23,449
these sounds how does that data

348
00:13:29,110 --> 00:13:25,430
collected by the rover get transmitted

349
00:13:32,559 --> 00:13:29,120
back to earth yeah so we we actually use

350
00:13:35,619 --> 00:13:32,569
our orbiters that are going around Mars

351
00:13:37,689 --> 00:13:35,629
that so so the rover collects its data

352
00:13:39,819 --> 00:13:37,699
then it transmits that data to our

353
00:13:41,619 --> 00:13:39,829
orbiters our orbiters transmitted

354
00:13:43,929 --> 00:13:41,629
through the Deep Space Network and then

355
00:13:46,389 --> 00:13:43,939
that all comes together in Mission

356
00:13:48,549 --> 00:13:46,399
Control at JPL and so that's how we get

357
00:13:49,900 --> 00:13:48,559
our data and it's not an instant thing

358
00:13:52,449 --> 00:13:49,910
it takes some time for that to happen

359
00:13:53,860 --> 00:13:52,459
and our orbiters only get into a

360
00:13:55,559 --> 00:13:53,870
configuration where we can communicate

361
00:13:58,299 --> 00:13:55,569
with them at certain times of the day

362
00:14:00,610 --> 00:13:58,309
but we we know those ahead of time and

363
00:14:02,379 --> 00:14:00,620

so we can basically plan the times when

364
00:14:04,030 --> 00:14:02,389
the rover basically picks up the phone

365
00:14:08,769 --> 00:14:04,040
to call the orbiters and send the data

366
00:14:12,009 --> 00:14:08,779
back to earth questions are just pouring

367
00:14:14,499 --> 00:14:12,019
in here oh my goodness a lot of them are

368
00:14:16,660 --> 00:14:14,509
engineering questions you're a project

369
00:14:20,019 --> 00:14:16,670
scientist I want to try to keep this

370
00:14:22,989 --> 00:14:20,029
focus on science today but I will ask

371
00:14:26,439 --> 00:14:22,999
something from someone whose dream job

372
00:14:27,759 --> 00:14:26,449
is is to work on a mission like this and

373
00:14:30,369 --> 00:14:27,769
it might give you a chance to talk about

374
00:14:32,919 --> 00:14:30,379
the diverse backgrounds of your your

375
00:14:35,799 --> 00:14:32,929
colleagues on Mars 2020

376
00:14:37,509 --> 00:14:35,809
so like Arcia on facebook wants to know

377
00:14:40,030 --> 00:14:37,519
do you have a job there for an oil

378
00:14:43,119 --> 00:14:40,040
engineer is working with aerospace is

379
00:14:45,579 --> 00:14:43,129
his dream yes you know that's actually

380
00:14:46,900 --> 00:14:45,589
that's a fantastic question one of my

381
00:14:48,939 --> 00:14:46,910
favorite thing is about working on a

382
00:14:51,369 --> 00:14:48,949
rover mission is the diversity of the

383
00:14:52,629 --> 00:14:51,379
people who were behind the rover mission

384
00:14:54,489 --> 00:14:52,639
and you'll get to hear about some of

385
00:14:57,100 --> 00:14:54,499
those in the coming weeks but from a

386
00:14:59,079 --> 00:14:57,110
science side we have you know people who

387
00:15:01,600 --> 00:14:59,089
consider themselves planetary scientist

388
00:15:03,429 --> 00:15:01,610

or planetary geologist like myself but

389
00:15:05,679 --> 00:15:03,439
we also have biologists and physics

390
00:15:07,090 --> 00:15:05,689
physicists and chemists and there's

391
00:15:08,650 --> 00:15:07,100
there's a place for everyone because

392
00:15:10,360 --> 00:15:08,660
when we send these rubber missions

393
00:15:12,100 --> 00:15:10,370
there's so many different aspects and

394
00:15:14,530 --> 00:15:12,110
scientific approaches that we take to

395
00:15:16,090 --> 00:15:14,540
understand the data that comes back and

396
00:15:18,669 --> 00:15:16,100
and for people who are focused on

397
00:15:20,019 --> 00:15:18,679
instruments and instrumentation of

398
00:15:21,610 --> 00:15:20,029
course we need those folks as well

399
00:15:23,289 --> 00:15:21,620
because we operate these instruments on

400
00:15:25,090 --> 00:15:23,299
Mars and in unique environments and

401
00:15:27,639 --> 00:15:25,100
we're also looking to understand the

402
00:15:29,259 --> 00:15:27,649
climate of Mars both present and past so

403
00:15:31,269 --> 00:15:29,269
mr. Urich science is an important part

404
00:15:33,549 --> 00:15:31,279
of what we do with with these Mars

405
00:15:34,869 --> 00:15:33,559
missions and of course engineers you

406
00:15:36,429 --> 00:15:34,879
know all different types of engineering

407
00:15:37,900 --> 00:15:36,439
system engineering mechanical

408
00:15:40,420 --> 00:15:37,910
engineering Electrical Engineering all

409
00:15:42,179 --> 00:15:40,430
very important for getting a rover built

410
00:15:45,400 --> 00:15:42,189
in and operating safely on the surface

411
00:15:48,280 --> 00:15:45,410
so you mentioned Stephanie an oil

412
00:15:50,919 --> 00:15:48,290
engineer and so this is an interesting

413
00:15:53,319 --> 00:15:50,929

question because some of the strategies

414
00:15:54,939 --> 00:15:53,329
that the oil and gas industry uses on

415
00:15:56,169 --> 00:15:54,949
earth is very similar to some of the

416
00:15:59,100 --> 00:15:56,179
approaches that we take when we're

417
00:16:01,119 --> 00:15:59,110
searching for organics on on Mars and so

418
00:16:02,619 --> 00:16:01,129
Delta's are a place that the oil

419
00:16:03,759 --> 00:16:02,629
industry is very interested in the rock

420
00:16:05,230 --> 00:16:03,769
record here on earth and we're

421
00:16:07,540 --> 00:16:05,240
interested in them on Mars because they

422
00:16:09,669 --> 00:16:07,550
are a great way to concentrate organic

423
00:16:11,290 --> 00:16:09,679
matter and so we use some of the same

424
00:16:12,609 --> 00:16:11,300
strategies that scientists have been

425
00:16:14,949 --> 00:16:12,619
using and geologists have been using

426
00:16:16,629 --> 00:16:14,959
here on earth for four decades now to

427
00:16:19,600 --> 00:16:16,639
search for organics on earth and we're

428
00:16:21,519 --> 00:16:19,610
using those to study organics on Mars we

429
00:16:23,559 --> 00:16:21,529
also have some shared ties in terms of

430
00:16:25,780 --> 00:16:23,569
our the way that we drill and and

431
00:16:26,829 --> 00:16:25,790
understand you know drilling technology

432
00:16:28,210 --> 00:16:26,839
and that's of course something that's

433
00:16:30,069 --> 00:16:28,220
very relevant in the oil and gas

434
00:16:31,480 --> 00:16:30,079
industry here on earth and and we

435
00:16:33,009 --> 00:16:31,490
there's some lessons learned that we've

436
00:16:36,100 --> 00:16:33,019
taken from that industry and applied to

437
00:16:38,110 --> 00:16:36,110
how we learn and develop our drills that

438
00:16:39,340 --> 00:16:38,120

we use to samp's on Mars so there are a

439
00:16:41,259 --> 00:16:39,350
lot of connections there and I think

440
00:16:42,460 --> 00:16:41,269
those connections exist for a lot of

441
00:16:43,840 --> 00:16:42,470
different fields in science and

442
00:16:46,119 --> 00:16:43,850
engineering here on earth

443
00:16:48,730 --> 00:16:46,129
and there's easy translation of those

444
00:16:53,860 --> 00:16:48,740
those skills here on earth to studying

445
00:16:56,590 --> 00:16:53,870
another planet so man drone and row in

446
00:16:59,259 --> 00:16:56,600
the YouTube chat wants to know how the

447
00:17:01,889 --> 00:16:59,269
samples that purse parents will collect

448
00:17:04,480 --> 00:17:01,899
how will they get back to earth

449
00:17:06,519 --> 00:17:04,490
yes that's a that's a fantastic question

450
00:17:07,870 --> 00:17:06,529
and we're all very excited about the

451
00:17:10,179 --> 00:17:07,880
potential for bringing those samples

452
00:17:12,850 --> 00:17:10,189
back and right now NASA has has

453
00:17:16,389 --> 00:17:12,860
developed a an architecture that's

454
00:17:17,679 --> 00:17:16,399
that's in development and in work for

455
00:17:19,600 --> 00:17:17,689
how we would bring those samples back

456
00:17:22,419 --> 00:17:19,610
and it involves participation from

457
00:17:24,699 --> 00:17:22,429
international space agencies as well and

458
00:17:28,210 --> 00:17:24,709
so the concept right now involves

459
00:17:30,909 --> 00:17:28,220
another multi staged mission mission

460
00:17:32,740 --> 00:17:30,919
series of missions the first of which is

461
00:17:34,600 --> 00:17:32,750
is of course the perseverance rover and

462
00:17:37,779 --> 00:17:34,610
we collect and cache those samples and

463
00:17:39,639 --> 00:17:37,789

then sometime down the road the next leg

464
00:17:41,140 --> 00:17:39,649
of sample return would arrive and we

465
00:17:43,960 --> 00:17:41,150
anticipate that that that

466
00:17:46,210 --> 00:17:43,970
Legg will involve a small Rover called a

467
00:17:48,580 --> 00:17:46,220
fetch Rover that's what we call it now

468
00:17:50,350 --> 00:17:48,590
that would have the potential to go out

469
00:17:52,150 --> 00:17:50,360
and collectibles that perseverance has

470
00:17:54,640 --> 00:17:52,160
put down on the surface and it would

471
00:17:57,670 --> 00:17:54,650
have an ascent vehicle that would help

472
00:17:59,350 --> 00:17:57,680
get those samples once delivered back up

473
00:18:01,600 --> 00:17:59,360
into orbit where it would potentially

474
00:18:03,370 --> 00:18:01,610
rendezvous with an orbiter that would

475
00:18:04,990 --> 00:18:03,380
then come back to earth there might be

476
00:18:07,720 --> 00:18:05,000
another leg there as well

477
00:18:09,130 --> 00:18:07,730
orbiting Earth and eventually we would

478
00:18:10,870 --> 00:18:09,140
look to get those samples back to the

479
00:18:13,060 --> 00:18:10,880
surface so those details are all still

480
00:18:15,190 --> 00:18:13,070
in work but it's what I can say is it's

481
00:18:17,080 --> 00:18:15,200
definitely a multi leg mission with

482
00:18:18,669 --> 00:18:17,090
international participation because this

483
00:18:20,110 --> 00:18:18,679
is a big effort and I think we all need

484
00:18:22,810 --> 00:18:20,120
to it's important that we're all working

485
00:18:24,970 --> 00:18:22,820
together bringing you know all of our

486
00:18:26,919 --> 00:18:24,980
expertise in in planetary exploration to

487
00:18:32,220 --> 00:18:26,929
bear on on accomplishing the goal of

488
00:18:34,990 --> 00:18:32,230

sample return so specifically on 2020

489
00:18:36,850 --> 00:18:35,000
Alex and Donnie are both wondering the

490
00:18:42,280 --> 00:18:36,860
same thing what's the expected lifespan

491
00:18:44,350 --> 00:18:42,290
of this Rover so it's how we determine

492
00:18:46,810 --> 00:18:44,360
that for for Mars mission mission is not

493
00:18:49,060 --> 00:18:46,820
just perseverance but we we have a prime

494
00:18:50,980 --> 00:18:49,070
a prime mission span and so that's

495
00:18:53,380 --> 00:18:50,990
basically the the period of time that

496
00:18:55,780 --> 00:18:53,390
the the rover is kind of its guaranteed

497
00:18:58,540 --> 00:18:55,790
lifetime and we determine that via

498
00:19:01,299 --> 00:18:58,550
testing and so the the guaranteed

499
00:19:05,860 --> 00:19:01,309
lifetime for the perseverance Rover is

500
00:19:08,230 --> 00:19:05,870
one Mars year or about to earth as many

501
00:19:10,540 --> 00:19:08,240
may be familiar previous Rovers like

502
00:19:12,340 --> 00:19:10,550
opportunity and spirit and curiosity

503
00:19:14,680 --> 00:19:12,350
still in the service today has way

504
00:19:16,510 --> 00:19:14,690
outlived their prime mission and so we

505
00:19:18,340 --> 00:19:16,520
are optimistic that that could happen as

506
00:19:20,590 --> 00:19:18,350
well with perseverance but the

507
00:19:25,600 --> 00:19:20,600
guaranteed lifetime is one Mars year or

508
00:19:27,580 --> 00:19:25,610
about two earth years all right

509
00:19:29,710 --> 00:19:27,590
scanning for more questions they are

510
00:19:33,940 --> 00:19:29,720
just pouring in from around the world

511
00:19:36,669 --> 00:19:33,950
here thank you so much everybody so P

512
00:19:39,720 --> 00:19:36,679
Utley on YouTube want to know if there

513
00:19:42,400 --> 00:19:39,730

is something specific with this Rover

514
00:19:44,080 --> 00:19:42,410
that you are hoping to discover that

515
00:19:48,160 --> 00:19:44,090
other Rovers simply weren't advanced

516
00:19:50,800 --> 00:19:48,170
enough to do yes that's a fantastic

517
00:19:52,930 --> 00:19:50,810
question and it really gets to the core

518
00:19:54,850 --> 00:19:52,940
of what Mars 2020 and persevere all

519
00:19:57,340 --> 00:19:54,860
about and this is our search

520
00:19:59,980 --> 00:19:57,350
for biosignatures so the perseverance

521
00:20:02,410 --> 00:19:59,990
rover has two brand-new instruments on

522
00:20:05,620 --> 00:20:02,420
the end of its arm that have the ability

523
00:20:08,260 --> 00:20:05,630
to map very fine scale textures in the

524
00:20:10,690 --> 00:20:08,270
rocks with very fine scale composition

525
00:20:12,820 --> 00:20:10,700
in the rocks and we can create those

526
00:20:14,799 --> 00:20:12,830
maps and then basically overlay them on

527
00:20:16,780 --> 00:20:14,809
top of each other and look for very

528
00:20:18,730 --> 00:20:16,790
distinct patterns both in the textures

529
00:20:21,280 --> 00:20:18,740
and the composition of the those rocks

530
00:20:23,650 --> 00:20:21,290
emission of organics that can give us a

531
00:20:26,590 --> 00:20:23,660
clue that life once had a role to play

532
00:20:29,110 --> 00:20:26,600
in the creation of those signatures and

533
00:20:30,940 --> 00:20:29,120
previous Rover missions have have of

534
00:20:32,919 --> 00:20:30,950
course sampled rocks on Mars and looked

535
00:20:34,960 --> 00:20:32,929
for organics but they do in a way that

536
00:20:36,610 --> 00:20:34,970
basically grinds up the rocks and and

537
00:20:39,280 --> 00:20:36,620
destroys the evidence of those textures

538
00:20:41,860 --> 00:20:39,290

in that sample with Mars 2020 and

539
00:20:44,049 --> 00:20:41,870
perseverance were able to preserve those

540
00:20:46,570 --> 00:20:44,059
textures analyze them at a very fine

541
00:20:48,070 --> 00:20:46,580
scale and those are exactly the

542
00:20:49,690 --> 00:20:48,080
techniques that we use on earth when

543
00:20:52,030 --> 00:20:49,700
we're searching for signs of ancient

544
00:20:54,280 --> 00:20:52,040
life in our own rock record and so I

545
00:20:56,890 --> 00:20:54,290
think that the perseverance rover is is

546
00:20:58,720 --> 00:20:56,900
the best-equipped of any Mars rover to

547
00:21:00,370 --> 00:20:58,730
actually seek those signs of upon Mars

548
00:21:02,740 --> 00:21:00,380
and our payload can help support that

549
00:21:05,020 --> 00:21:02,750
and so we're hoping to really make

550
00:21:06,909 --> 00:21:05,030
progress on on that question the

551
00:21:12,270 --> 00:21:06,919
question of life on Mars and our payload

552
00:21:15,760 --> 00:21:12,280
is really well suited to doing that so

553
00:21:18,370 --> 00:21:15,770
let's see here Connor on YouTube also

554
00:21:21,159 --> 00:21:18,380
asks what energy source will this Rover

555
00:21:24,010 --> 00:21:21,169
use yes so we have a similar energy

556
00:21:27,640 --> 00:21:24,020
source as the the Curiosity rover

557
00:21:30,299 --> 00:21:27,650
it's a radio isotope thermal generator

558
00:21:33,730 --> 00:21:30,309
and it's actually similar to it to what

559
00:21:36,730 --> 00:21:33,740
Mark mark Watney used in that in the

560
00:21:39,940 --> 00:21:36,740
Martian movie and how it kept he kept

561
00:21:42,909 --> 00:21:39,950
warm and so we have a similar similar

562
00:21:44,770 --> 00:21:42,919
system on on perserverance and it not

563
00:21:46,450 --> 00:21:44,780

only generates energy to keep the river

564
00:21:49,270 --> 00:21:46,460
going but it also of course generates

565
00:21:50,980 --> 00:21:49,280
the heat that helps to warm up the other

566
00:21:52,690 --> 00:21:50,990
parts of the Rovers that we can operate

567
00:21:57,159 --> 00:21:52,700
even though it's very cold on the

568
00:21:59,530 --> 00:21:57,169
surface of Mars so we're also getting

569
00:22:02,260 --> 00:21:59,540
some questions about the recently named

570
00:22:05,049 --> 00:22:02,270
ingenuity helicopter which is definitely

571
00:22:08,680 --> 00:22:05,059
separate from your flagship mission it's

572
00:22:11,710 --> 00:22:08,690
a technology demonstration but okay

573
00:22:15,190 --> 00:22:11,720
you know what are you excited about the

574
00:22:19,090 --> 00:22:15,200
helicopter and you know what might it be

575
00:22:22,750 --> 00:22:19,100
able to tell us yes oh that ingenuity

576
00:22:25,630 --> 00:22:22,760
newly named just yesterday is is a

577
00:22:27,610 --> 00:22:25,640
technology demonstration riding along

578
00:22:29,080 --> 00:22:27,620
with the perseverance Rover and will

579
00:22:31,990 --> 00:22:29,090
carry it on the belly of the rover and

580
00:22:33,910 --> 00:22:32,000
sometime in the first first months of

581
00:22:36,670 --> 00:22:33,920
the mission will it will drop ingenuity

582
00:22:39,400 --> 00:22:36,680
drive a little ways away and it'll do a

583
00:22:41,110 --> 00:22:39,410
series of test flights and this will be

584
00:22:43,630 --> 00:22:41,120
the first time that we're testing out a

585
00:22:46,420 --> 00:22:43,640
helicopter in a Mars Mars environment

586
00:22:48,850 --> 00:22:46,430
Mars atmosphere and so we're looking to

587
00:22:51,400 --> 00:22:48,860
to really just prove that that it can

588
00:22:53,920 --> 00:22:51,410

work that we can take a helicopter even

589
00:22:55,870 --> 00:22:53,930
though the Mars atmospheric pressure is

590
00:22:57,670 --> 00:22:55,880
so much lower than than here on earth

591
00:23:00,250 --> 00:22:57,680
and actually operate that kind of

592
00:23:02,020 --> 00:23:00,260
technology so a small number of flights

593
00:23:05,290 --> 00:23:02,030
just to prove that it can go up and go

594
00:23:06,790 --> 00:23:05,300
down maybe move laterally we expect that

595
00:23:08,200 --> 00:23:06,800
it's going to take some images while

596
00:23:10,930 --> 00:23:08,210
it's up in the air and we're very

597
00:23:12,100 --> 00:23:10,940
excited to get those images down mate

598
00:23:13,990 --> 00:23:12,110
perhaps we'll even be able to take a

599
00:23:15,850 --> 00:23:14,000
picture of the rover from the helicopter

600
00:23:18,430 --> 00:23:15,860
that'll be a great a great image I think

601
00:23:19,570 --> 00:23:18,440
for us all to see and so we're we're

602
00:23:21,730 --> 00:23:19,580
interested in learning how this

603
00:23:23,860 --> 00:23:21,740
technology works on Mars with an eye

604
00:23:25,900 --> 00:23:23,870
towards future of Mars exploration that

605
00:23:27,910 --> 00:23:25,910
might take advantage of the same kind of

606
00:23:30,670 --> 00:23:27,920
helicopter technology that would allow

607
00:23:33,070 --> 00:23:30,680
us to explore you know large distances

608
00:23:35,140 --> 00:23:33,080
on the surface of Mars with a single

609
00:23:38,380 --> 00:23:35,150
helicopter leap so we're excited to see

610
00:23:41,110 --> 00:23:38,390
how ingenuity operates in the Mars

611
00:23:45,460 --> 00:23:41,120
environment and we're looking forward to

612
00:23:46,780 --> 00:23:45,470
that technology demonstration so you

613
00:23:49,600 --> 00:23:46,790

mentioned some of the challenges that

614
00:23:51,640 --> 00:23:49,610
the the helicopter will face what are

615
00:23:54,790 --> 00:23:51,650
some of the biggest challenges to

616
00:23:57,850 --> 00:23:54,800
designing a vehicle that can function on

617
00:24:03,370 --> 00:23:57,860
a foreign planet this is from Manish on

618
00:24:05,260 --> 00:24:03,380
Twitter yes so one of our our biggest

619
00:24:06,940 --> 00:24:05,270
challenges actually with the Curiosity

620
00:24:10,360 --> 00:24:06,950
rover that's currently exploring Gale

621
00:24:12,460 --> 00:24:10,370
Crater right now was was its wheels very

622
00:24:13,990 --> 00:24:12,470
early on in the mission we discovered

623
00:24:16,330 --> 00:24:14,000
with curiosity that it's wheels were

624
00:24:19,090 --> 00:24:16,340
such more wear and tear than we had

625
00:24:21,100 --> 00:24:19,100
originally expected and is about 300

626
00:24:22,300 --> 00:24:21,110
days into the mission where we noticed

627
00:24:24,550 --> 00:24:22,310
these big gashes in the

628
00:24:26,440 --> 00:24:24,560
wheels and you know that was a big

629
00:24:28,390 --> 00:24:26,450
threat to curiosity's mission and Gale

630
00:24:29,920 --> 00:24:28,400
Crater of course that mission is still

631
00:24:31,720 --> 00:24:29,930
ongoing and we've learned how to use the

632
00:24:33,790 --> 00:24:31,730
wheels as a resource but we decided when

633
00:24:35,650 --> 00:24:33,800
we were developing and designing the

634
00:24:36,880 --> 00:24:35,660
perseverance rover that we didn't want

635
00:24:39,070 --> 00:24:36,890
to have to worry about that kind of

636
00:24:41,110 --> 00:24:39,080
issue on Mars with perseverance so an

637
00:24:43,360 --> 00:24:41,120
example of how we've kind of taken a

638
00:24:46,390 --> 00:24:43,370

previous challenge and adapted to it

639
00:24:48,280 --> 00:24:46,400
we've made the perseverance wheel much

640
00:24:50,980 --> 00:24:48,290
stronger they're a little bit heavier

641
00:24:52,360 --> 00:24:50,990
but they're much more robust to the type

642
00:24:53,920 --> 00:24:52,370
of terrain that we expect to encounter

643
00:24:56,440 --> 00:24:53,930
on Mars so we're hoping that that's

644
00:24:58,120 --> 00:24:56,450
actually not a challenge for us but

645
00:25:01,180 --> 00:24:58,130
that's that's one example of the type of

646
00:25:02,920 --> 00:25:01,190
challenge that we can encounter I think

647
00:25:05,860 --> 00:25:02,930
for us one of our biggest challenges

648
00:25:08,080 --> 00:25:05,870
that we'll look to to to overcome I

649
00:25:10,120 --> 00:25:08,090
think is is you know we are responsible

650
00:25:12,190 --> 00:25:10,130
for collecting the samples for potential

651
00:25:14,530 --> 00:25:12,200
sample return oh we're gonna have to

652
00:25:16,750 --> 00:25:14,540
move expeditiously through our landing

653
00:25:18,430 --> 00:25:16,760
site and be efficient with our

654
00:25:21,580 --> 00:25:18,440
exploration while at the same time

655
00:25:23,620 --> 00:25:21,590
making good science decisions about the

656
00:25:25,360 --> 00:25:23,630
samples we collect and so I think where

657
00:25:27,460 --> 00:25:25,370
we feel the responsibility and we're

658
00:25:29,200 --> 00:25:27,470
excited to have that responsibility but

659
00:25:31,630 --> 00:25:29,210
we know that that future generations of

660
00:25:33,910 --> 00:25:31,640
scientists are depending on us to put

661
00:25:39,310 --> 00:25:33,920
together a good sample cache and so we

662
00:25:42,430 --> 00:25:39,320
take that seriously all right back to

663
00:25:45,580 --> 00:25:42,440

the science he run smart nerd and snob

664
00:25:47,680 --> 00:25:45,590
noms over the YouTube chat and having a

665
00:25:49,210 --> 00:25:47,690
conversation about the Martian

666
00:25:52,990 --> 00:25:49,220
blueberries that were found by the

667
00:25:55,120 --> 00:25:53,000
spirit rover the hematite so they were

668
00:25:58,930 --> 00:25:55,130
wondering if you could explain what

669
00:26:00,820 --> 00:25:58,940
these blue pebbles were a sign of and do

670
00:26:04,630 --> 00:26:00,830
you expect to find something like that

671
00:26:10,300 --> 00:26:04,640
with perseverance could you repeat the

672
00:26:12,340 --> 00:26:10,310
question sure so can you explain this

673
00:26:15,370 --> 00:26:12,350
this is this is going back a little bit

674
00:26:18,010 --> 00:26:15,380
to the Mars Exploration Rover spirit

675
00:26:20,440 --> 00:26:18,020
when it found the Martian blueberries or

676
00:26:23,800 --> 00:26:20,450
hematite pebbles why was that

677
00:26:26,380 --> 00:26:23,810
significant in you know just

678
00:26:28,600 --> 00:26:26,390
scientifically and what kind of

679
00:26:33,760 --> 00:26:28,610
discoveries do you hope that you might

680
00:26:34,840 --> 00:26:33,770
make with perseverance yes so the the

681
00:26:36,150 --> 00:26:34,850
early part of the question was still

682
00:26:37,860 --> 00:26:36,160
coming in a little garbled but

683
00:26:40,770 --> 00:26:37,870
I'll address the second half which was

684
00:26:43,200 --> 00:26:40,780
what we're looking to discover with

685
00:26:44,909 --> 00:26:43,210
perseverance and so I mentioned bio

686
00:26:48,419 --> 00:26:44,919
signatures and I think that's really a

687
00:26:50,340 --> 00:26:48,429
key part of what we're searching for

688
00:26:52,380 --> 00:26:50,350

with Mars 2020 and the perseverance

689
00:26:54,690 --> 00:26:52,390
Rover that we'll be looking to explore

690
00:26:56,789 --> 00:26:54,700
these sediments of the ancient Delta

691
00:26:58,500 --> 00:26:56,799
present and jezero crater looking for

692
00:27:00,810 --> 00:26:58,510
signs of ancient life and looking to

693
00:27:03,330 --> 00:27:00,820
understand the evolution of that Delta

694
00:27:05,220 --> 00:27:03,340
over time and Delta's are exciting

695
00:27:07,049 --> 00:27:05,230
because they represent we know we know

696
00:27:09,270 --> 00:27:07,059
they get deposited in standing bodies of

697
00:27:12,210 --> 00:27:09,280
water and so we'll be looking to to

698
00:27:14,940 --> 00:27:12,220
track the evolution of of water in the

699
00:27:16,590 --> 00:27:14,950
history of ancient Mars and so go

700
00:27:18,419 --> 00:27:16,600
looking for evidence of mental change

701
00:27:20,100 --> 00:27:18,429
and in places that in the rock record

702
00:27:22,289 --> 00:27:20,110
that we think we're once habitable and

703
00:27:24,419 --> 00:27:22,299
also with an eye towards collecting

704
00:27:26,760 --> 00:27:24,429
samples that can tell us more about the

705
00:27:28,740 --> 00:27:26,770
evolution of Mars as a planet looking

706
00:27:31,529 --> 00:27:28,750
for a diversity of geological

707
00:27:33,240 --> 00:27:31,539
environments evidence of volcanism and

708
00:27:34,919 --> 00:27:33,250
impact processes as well as the

709
00:27:37,850 --> 00:27:34,929
sedimentary processes that we know

710
00:27:40,880 --> 00:27:37,860
deposited the lake and Delta sediments

711
00:27:43,230 --> 00:27:40,890
well looking for evidence of water

712
00:27:44,640 --> 00:27:43,240
interactions and that might be relevant

713
00:27:46,560 --> 00:27:44,650

to the early part of the question that I

714
00:27:48,960 --> 00:27:46,570
think was referencing spirit so we

715
00:27:52,169 --> 00:27:48,970
looking to understand how water moving

716
00:27:54,299 --> 00:27:52,179
through the subsurface of Mars had had

717
00:27:56,310 --> 00:27:54,309
an impact whether that was created

718
00:27:58,770 --> 00:27:56,320
habitable environments and in the

719
00:28:00,779 --> 00:27:58,780
subsurface of Mars and understanding how

720
00:28:02,640 --> 00:28:00,789
how fluids interacted with with the

721
00:28:04,140 --> 00:28:02,650
rocks and how they they changed the

722
00:28:05,399 --> 00:28:04,150
rocks over time and that tells us a lot

723
00:28:08,990 --> 00:28:05,409
about the environment and how the

724
00:28:12,299 --> 00:28:09,000
surface of Mars has evolved through time

725
00:28:15,240 --> 00:28:12,309
all right thank you so much Katie for

726
00:28:16,980 --> 00:28:15,250
answering so many questions with this I

727
00:28:17,730 --> 00:28:16,990
think I'm gonna go ahead and hand it

728
00:28:20,159 --> 00:28:17,740
back to you

729
00:28:21,840 --> 00:28:20,169
marina and thank you both this has been

730
00:28:24,990 --> 00:28:21,850
so fun to be able to bring so many

731
00:28:26,970 --> 00:28:25,000
questions to you and as we navigate the

732
00:28:29,730 --> 00:28:26,980
the new normal if you can call it that

733
00:28:32,460 --> 00:28:29,740
of live-streaming and dealing with all

734
00:28:34,980 --> 00:28:32,470
of our technical issues of connecting

735
00:28:37,159 --> 00:28:34,990
from our homes but we can still be alone

736
00:28:39,960 --> 00:28:37,169
together right Marina

737
00:28:41,820 --> 00:28:39,970
that's right Stephanie thank you so much

738
00:28:44,399 --> 00:28:41,830

to the audience who participated those

739
00:28:46,200 --> 00:28:44,409
were amazing questions I know everyone

740
00:28:48,600 --> 00:28:46,210
is really excited thank you so much

741
00:28:49,800 --> 00:28:48,610
Stephanie and thank you so much Katie I

742
00:28:51,090 --> 00:28:49,810
know all of us are

743
00:28:53,220 --> 00:28:51,100
really looking forward to the science

744
00:28:55,080 --> 00:28:53,230
return I know that I'm very much looking

745
00:28:56,880 --> 00:28:55,090
for a weather station science return

746
00:28:59,010 --> 00:28:56,890
that we're going to get from that but

747
00:29:02,100 --> 00:28:59,020
thank you Katie thank you so much for

748
00:29:03,810 --> 00:29:02,110
everybody with us joining us live today

749
00:29:06,840 --> 00:29:03,820
now the launch window for Mars 2020

750
00:29:10,740 --> 00:29:06,850
opens on July 17th and will land on the

751
00:29:13,170 --> 00:29:10,750
Red Planet on February 18th in 2021 and

752
00:29:15,840 --> 00:29:13,180
for the latest on the Mars 2020 mission

753
00:29:18,570 --> 00:29:15,850
follow NASA persevere on all social

754
00:29:20,730 --> 00:29:18,580
media platforms and you can watch all of

755
00:29:24,780 --> 00:29:20,740
the behind the spacecraft video profiles

756
00:29:26,520 --> 00:29:24,790
on the NASA 360 youtube channel now

757
00:29:29,460 --> 00:29:26,530
we're going to be doing QAS with Mars

758
00:29:32,190 --> 00:29:29,470
2020 team members each Thursday right at

759
00:29:34,680 --> 00:29:32,200
the same time at 1 p.m. Pacific and 4

760
00:29:37,350 --> 00:29:34,690
p.m. Eastern for the next few weeks so

761
00:29:39,330 --> 00:29:37,360
make sure to tune in as we all know gate

762
00:29:42,660 --> 00:29:39,340
through this time together make sure to