
SONY

1
00:00:03,830 --> 00:00:01,589
so we will be able to do wide

2
00:00:05,510 --> 00:00:03,840
stereoscopic pan zooms looking over our

3
00:00:07,030 --> 00:00:05,520
shoulder and all that kind of stuff now

4
00:00:08,390 --> 00:00:07,040
we can't get the data back the way he

5
00:00:10,629 --> 00:00:08,400
would when he filmed avatar in new

6
00:00:12,950 --> 00:00:10,639
zealand because mars is unfortunately

7
00:00:15,669 --> 00:00:12,960
rather far away but we will get pieces

8
00:00:18,790 --> 00:00:15,679
and he will make mars the movie in 3d

9
00:00:20,070 --> 00:00:18,800
as part of his job to bring mars to you

10
00:00:21,590 --> 00:00:20,080
and the other reason for that imaging

11
00:00:23,269 --> 00:00:21,600
system is by having that wide field of

12
00:00:25,990 --> 00:00:23,279
view we can better plan where we want to

13
00:00:27,589 --> 00:00:26,000

go mer is like looking like this

14
00:00:29,750 --> 00:00:27,599
and hoping once a day to get a picture

15
00:00:32,389 --> 00:00:29,760
back we plan this will look at the room

16
00:00:33,670 --> 00:00:32,399
the way we see it and we can dial in 10x

17
00:00:35,590 --> 00:00:33,680
so i could look back and see what the

18
00:00:37,830 --> 00:00:35,600
camera guy back there is doing make sure

19
00:00:39,110 --> 00:00:37,840
he's not making fun of me it's okay and

20
00:00:41,910 --> 00:00:39,120
check it out we can do that with this

21
00:00:43,990 --> 00:00:41,920
vehicle so msl is our first mission to

22
00:00:46,389 --> 00:00:44,000
search for the building blocks of life

23
00:00:47,910 --> 00:00:46,399
sometime in the next 10 or 15 years the

24
00:00:50,150 --> 00:00:47,920
next part of the legacy of getting to

25
00:00:53,029 --> 00:00:50,160
mars will happen before we send you to

26
00:00:54,709 --> 00:00:53,039
mars most engineers and scientists

27
00:00:56,229 --> 00:00:54,719
believe we have to go to mars and bring

28
00:00:59,830 --> 00:00:56,239
back a piece of mars to earth

29
00:01:01,189 --> 00:00:59,840
intentionally the right piece safely

30
00:01:02,790 --> 00:01:01,199
that it will be the most complicated

31
00:01:03,590 --> 00:01:02,800
robotic mission ever done by women and

32
00:01:05,990 --> 00:01:03,600
men

33
00:01:07,510 --> 00:01:06,000
seriously it's tougher than hubble and

34
00:01:09,429 --> 00:01:07,520
this is what it might look like the mars

35
00:01:11,109 --> 00:01:09,439
sample return mission is a favored

36
00:01:13,990 --> 00:01:11,119
mission in the planning for what we do

37
00:01:16,550 --> 00:01:14,000
to planets robots for the next 15 years

38
00:01:18,630 --> 00:01:16,560

we will land a vehicle that will descend

39
00:01:21,510 --> 00:01:18,640
to mars in a place where we think the

40
00:01:23,910 --> 00:01:21,520
materials the rocks will tell us things

41
00:01:25,670 --> 00:01:23,920
about whether mars was ever alive

42
00:01:27,749 --> 00:01:25,680
it will land using a sky crane on a big

43
00:01:29,670 --> 00:01:27,759
lander the lander in this case will

44
00:01:32,149 --> 00:01:29,680
carry a small vehicle to sample the

45
00:01:34,550 --> 00:01:32,159
rocks and then uh basically a cruise

46
00:01:36,870 --> 00:01:34,560
missile like rocket to blast the samples

47
00:01:38,550 --> 00:01:36,880
back out of the mars atmosphere

48
00:01:39,990 --> 00:01:38,560
forty percent the gravity of the earth

49
00:01:41,109 --> 00:01:40,000
and put them on a place where we could

50
00:01:43,030 --> 00:01:41,119
go get them

51
00:01:45,030 --> 00:01:43,040
and bring them home this will be an

52
00:01:47,510 --> 00:01:45,040
incredible mission you can see

53
00:01:49,190 --> 00:01:47,520
the rover the communications gear this

54
00:01:51,030 --> 00:01:49,200
is a solar-powered mission we hope to

55
00:01:52,389 --> 00:01:51,040
save some money a little fetch rover to

56
00:01:53,830 --> 00:01:52,399
go get the thing and then the rocket to

57
00:01:55,510 --> 00:01:53,840
bring the thing back

58
00:01:56,950 --> 00:01:55,520
this will be an amazing mission we have

59
00:01:58,469 --> 00:01:56,960
this is an artist rendering of what we

60
00:02:00,389 --> 00:01:58,479
hope it will look like

61
00:02:02,469 --> 00:02:00,399
you guys will see the results of that

62
00:02:04,469 --> 00:02:02,479
class of mission now someday and i can't

63
00:02:06,550 --> 00:02:04,479

vouch for the day someday the first

64
00:02:08,070 --> 00:02:06,560
human mission to mars will occur whether

65
00:02:10,469 --> 00:02:08,080
it looks like this international mission

66
00:02:13,110 --> 00:02:10,479
here coming in on this kind of vehicle i

67
00:02:15,030 --> 00:02:13,120
can't say it would be silly for me to

68
00:02:17,110 --> 00:02:15,040
design it for you today you guys can

69
00:02:19,589 --> 00:02:17,120
have to design it but our president said

70
00:02:21,350 --> 00:02:19,599
on april 15th mars is the goal

71
00:02:23,670 --> 00:02:21,360
and while these guys look a little

72
00:02:25,030 --> 00:02:23,680
unhappy and they're landing um i think

73
00:02:27,190 --> 00:02:25,040
if you were going to mars for the first

74
00:02:29,510 --> 00:02:27,200
time as people of planet earth i think

75
00:02:30,949 --> 00:02:29,520
you'd be rather excited because it's a

76
00:02:31,910 --> 00:02:30,959
big place

77
00:02:33,830 --> 00:02:31,920
you're not going to get stuck on

78
00:02:35,750 --> 00:02:33,840
gilligan's island if you get to mars

79
00:02:37,670 --> 00:02:35,760
plenty of stuff to do

80
00:02:40,150 --> 00:02:37,680
it's like an amusement park for science

81
00:02:42,390 --> 00:02:40,160
and engineering so how we land don't

82
00:02:43,910 --> 00:02:42,400
know this is one model here's a couple

83
00:02:46,550 --> 00:02:43,920
of women and men wandering around the

84
00:02:48,309 --> 00:02:46,560
surface but needless to say getting

85
00:02:50,390 --> 00:02:48,319
people there will increase the pace of

86
00:02:52,390 --> 00:02:50,400
how fast we learn about living off

87
00:02:54,550 --> 00:02:52,400
planet and going to other worlds beyond

88
00:02:56,229 --> 00:02:54,560

anything i can tell you about seriously

89
00:02:58,229 --> 00:02:56,239
but i thought i'd finish in my last two

90
00:03:00,470 --> 00:02:58,239
minutes if you give me one more second

91
00:03:03,430 --> 00:03:00,480
to show you what it might be like

92
00:03:04,949 --> 00:03:03,440
if you or i were to go to mars so mars

93
00:03:06,869 --> 00:03:04,959
is rising this was a program on

94
00:03:08,790 --> 00:03:06,879
discovery channel and other channels as

95
00:03:10,949 --> 00:03:08,800
well so we decided to go and try to

96
00:03:12,630 --> 00:03:10,959
bring mars on earth to you

97
00:03:14,229 --> 00:03:12,640
so i filmed this with some colleagues

98
00:03:15,670 --> 00:03:14,239
this is the newest land on earth the

99
00:03:18,470 --> 00:03:15,680
island of cersei off the coast of

100
00:03:20,470 --> 00:03:18,480
iceland formed in the 60s from volcanic

101
00:03:22,390 --> 00:03:20,480
eruptions from 200 meters deep water to

102
00:03:24,309 --> 00:03:22,400
make new land here's what it looks like

103
00:03:26,070 --> 00:03:24,319
coming in we actually had a cameraman

104
00:03:28,710 --> 00:03:26,080
hanging out the window of the helicopter

105
00:03:30,070 --> 00:03:28,720
not the safest thing um here's gullies

106
00:03:31,830 --> 00:03:30,080
that formed in the rocks that formed

107
00:03:33,509 --> 00:03:31,840
from that stuff the seaweed of course we

108
00:03:35,910 --> 00:03:33,519
wouldn't expect on mars these are

109
00:03:37,750 --> 00:03:35,920
gullies just like we see on mars this is

110
00:03:39,750 --> 00:03:37,760
what they would look like so imagine

111
00:03:41,589 --> 00:03:39,760
trying to traverse those yourself in a

112
00:03:43,350 --> 00:03:41,599
space suit where you don't want to fall

113
00:03:45,270 --> 00:03:43,360

down wouldn't be good you don't have a

114
00:03:46,710 --> 00:03:45,280
lot of time you got to do a lot of work

115
00:03:48,149 --> 00:03:46,720
and this is what it would look like to

116
00:03:50,309 --> 00:03:48,159
go up through a cross-section of the

117
00:03:52,309 --> 00:03:50,319
kind of gullies we might find on mars

118
00:03:53,910 --> 00:03:52,319
every one of these layers where you see

119
00:03:56,550 --> 00:03:53,920
bomb sags and all kinds of volcanic

120
00:03:59,110 --> 00:03:56,560
stuff could contain chemical tracers as

121
00:04:01,270 --> 00:03:59,120
you see even here there's me

122
00:04:02,949 --> 00:04:01,280
well i'm showing this with my mars pen

123
00:04:04,470 --> 00:04:02,959
showing the signs of life yeah i know

124
00:04:06,869 --> 00:04:04,480
you're laughing it was actually a warm

125
00:04:09,190 --> 00:04:06,879
day this is what we hope to find this

126
00:04:10,869 --> 00:04:09,200
little zone this steam vent with this

127
00:04:12,550 --> 00:04:10,879
green smudgy stuff

128
00:04:13,990 --> 00:04:12,560
is the kind of place that some

129
00:04:15,589 --> 00:04:14,000
astrobiologists think life could have

130
00:04:17,349 --> 00:04:15,599
sprung forth on earth

131
00:04:19,749 --> 00:04:17,359
we could have had hot vents and the

132
00:04:22,150 --> 00:04:19,759
crusty things here are actually colonial

133
00:04:25,830 --> 00:04:22,160
colonies of cyanobacteria growing in a

134
00:04:27,430 --> 00:04:25,840
place that did not exist 45 years ago so

135
00:04:30,150 --> 00:04:27,440
cersei is the kind of place where we get

136
00:04:32,230 --> 00:04:30,160
in one little area a microcosm in other

137
00:04:34,230 --> 00:04:32,240
places in iceland which are amazingly

138
00:04:36,390 --> 00:04:34,240

accessible as a place to think about

139
00:04:39,030 --> 00:04:36,400
mars on earth you can wander right up to

140
00:04:41,030 --> 00:04:39,040
a place where the geothermal energy that

141
00:04:43,189 --> 00:04:41,040
makes new crust under the ocean in 40

142
00:04:45,350 --> 00:04:43,199
000 kilometers of mid-ocean ridges comes

143
00:04:47,110 --> 00:04:45,360
on land so we wandered right up to these

144
00:04:49,510 --> 00:04:47,120
places that would be roped off with

145
00:04:51,909 --> 00:04:49,520
chains and guns and other places walked

146
00:04:53,830 --> 00:04:51,919
right up to them to sample the materials

147
00:04:55,749 --> 00:04:53,840
this would be our dream for mars these

148
00:04:57,590 --> 00:04:55,759
hot springs we find in places like

149
00:04:59,670 --> 00:04:57,600
iceland hawaii

150
00:05:01,990 --> 00:04:59,680
deep in the seafloor here blowing steam

151
00:05:03,830 --> 00:05:02,000
and gases are the kind of place where

152
00:05:06,070 --> 00:05:03,840
some scientists believe life could get

153
00:05:07,670 --> 00:05:06,080
its cradle it's warm it's wet it's full

154
00:05:09,430 --> 00:05:07,680
of energy it's full of nutrients there

155
00:05:11,270 --> 00:05:09,440
you see a little micro volcano that's my

156
00:05:12,469 --> 00:05:11,280
finger going over it

157
00:05:14,950 --> 00:05:12,479
all of these are interesting minerals

158
00:05:17,510 --> 00:05:14,960
involving sulfur and iron the bubbling

159
00:05:19,350 --> 00:05:17,520
bud pots again we think we see mineral

160
00:05:22,310 --> 00:05:19,360
expression of these kind of things like

161
00:05:24,230 --> 00:05:22,320
that on mars today from orbit so if that

162
00:05:26,230 --> 00:05:24,240
happened from orbit and we can see it

163
00:05:28,070 --> 00:05:26,240

then what's it like when you go up close

164
00:05:30,469 --> 00:05:28,080
well we don't know we haven't been

165
00:05:31,990 --> 00:05:30,479
they're harder to get to but msl has the

166
00:05:34,070 --> 00:05:32,000
tools and there i am sampling a big

167
00:05:35,350 --> 00:05:34,080
colony of cyanobacteria my name on my

168
00:05:38,070 --> 00:05:35,360
hammer

169
00:05:40,950 --> 00:05:38,080
this is billions of single-celled

170
00:05:43,350 --> 00:05:40,960
organisms growing in a slime across a

171
00:05:45,110 --> 00:05:43,360
hot geothermal vent in iceland we have

172
00:05:47,350 --> 00:05:45,120
similar things in yellowstone

173
00:05:49,590 --> 00:05:47,360
in the azores and other places so let me

174
00:05:50,790 --> 00:05:49,600
finish with the following thoughts

175
00:05:52,550 --> 00:05:50,800
i'm going to finish if you don't mind

176
00:05:54,390 --> 00:05:52,560
with a little bit of art history

177
00:05:56,230 --> 00:05:54,400
in 1958

178
00:05:57,909 --> 00:05:56,240
a famous american painter

179
00:05:59,909 --> 00:05:57,919
known as georgia o'keeffe

180
00:06:02,070 --> 00:05:59,919
painted this picture the latter to the

181
00:06:03,670 --> 00:06:02,080
moon from her house in taos new mexico

182
00:06:05,270 --> 00:06:03,680
she was a modernist

183
00:06:07,510 --> 00:06:05,280
worked with stieglitz and others if you

184
00:06:08,870 --> 00:06:07,520
know our history um she painted a lot of

185
00:06:11,029 --> 00:06:08,880
things that are kind of neat you know

186
00:06:12,390 --> 00:06:11,039
skulls of cows dying in the desert she

187
00:06:13,909 --> 00:06:12,400
painted this too

188
00:06:16,950 --> 00:06:13,919

it was painted on the eve of the

189
00:06:18,230 --> 00:06:16,960
formation of nasa very interesting she

190
00:06:20,710 --> 00:06:18,240
exposed it for the first time in the

191
00:06:22,390 --> 00:06:20,720
late 50s right as nasa was born as an

192
00:06:24,550 --> 00:06:22,400
organization you guys are all young a

193
00:06:26,870 --> 00:06:24,560
long time ago the 50s they were all nuts

194
00:06:29,110 --> 00:06:26,880
okay understood but

195
00:06:31,350 --> 00:06:29,120
her vision for that painting a ladder to

196
00:06:33,909 --> 00:06:31,360
the moon by people was resolved within a

197
00:06:35,510 --> 00:06:33,919
decade within a decade americans flew in

198
00:06:38,469 --> 00:06:35,520
orbit around the moon on spacecraft

199
00:06:40,390 --> 00:06:38,479
apollo 8 and within another year we

200
00:06:42,950 --> 00:06:40,400
landed on the surface of another world

201
00:06:45,110 --> 00:06:42,960
no human being has been back since

202
00:06:47,029 --> 00:06:45,120
so we she left a legacy in art and the

203
00:06:48,950 --> 00:06:47,039
question to you all to think about

204
00:06:50,550 --> 00:06:48,960
as many of you

205
00:06:52,710 --> 00:06:50,560
embrace your careers and your interests

206
00:06:54,070 --> 00:06:52,720
over the next 30 or 40 years where do

207
00:06:55,990 --> 00:06:54,080
you want to go where do you want your

208
00:06:58,790 --> 00:06:56,000
generation to take the people of planet

209
00:07:00,469 --> 00:06:58,800
earth lots of places to go

210
00:07:02,230 --> 00:07:00,479
the legacy in space is an interesting

211
00:07:04,390 --> 00:07:02,240
thing we live in space our planet is

212
00:07:06,469 --> 00:07:04,400
pummeled by cosmic collisions by the

213
00:07:08,550 --> 00:07:06,479

effect of the sun

214
00:07:10,150 --> 00:07:08,560
by how our planet was even potentially

215
00:07:11,990 --> 00:07:10,160
seated with the building blocks of life

216
00:07:14,710 --> 00:07:12,000
we don't know the answers but there will

217
00:07:16,550 --> 00:07:14,720
be a new ladder by some new artists and

218
00:07:18,150 --> 00:07:16,560
group of engineers and scientists like

219
00:07:19,830 --> 00:07:18,160
you that will take us somewhere there's

220
00:07:22,710 --> 00:07:19,840
the moon seen at

221
00:07:25,270 --> 00:07:22,720
half phase from new mexico in 1958 a

222
00:07:27,430 --> 00:07:25,280
long time ago what will be next our

223
00:07:30,629 --> 00:07:27,440
president on april 15 said that's your

224
00:07:32,309 --> 00:07:30,639
goal it's a hard goal it's a worthy goal

225
00:07:34,870 --> 00:07:32,319
the first nation or group of nations

226
00:07:36,390 --> 00:07:34,880
that get there will have boldly changed

227
00:07:38,230 --> 00:07:36,400
the way technology's done and i don't

228
00:07:40,070 --> 00:07:38,240
know how you'll go but if you choose to

229
00:07:43,270 --> 00:07:40,080
go i promise you because i've studied

230
00:07:45,270 --> 00:07:43,280
mars my full life japan i promise you

231
00:07:46,950 --> 00:07:45,280
you will find something literally earth

232
00:07:48,710 --> 00:07:46,960
shattering so

233
00:07:49,909 --> 00:07:48,720
it's a big solar system we started with

234
00:07:52,390 --> 00:07:49,919
our own planet and looked at a lot of

235
00:07:55,430 --> 00:07:52,400
these worlds enigmatic venus tempting

236
00:07:57,589 --> 00:07:55,440
mars our own world a lot to learn but i

237
00:07:59,589 --> 00:07:57,599
think now is the time in this time of

238
00:08:01,189 --> 00:07:59,599

scientific revolutions on these worlds

239
00:08:03,189 --> 00:08:01,199
to think about where you're going to go

240
00:08:04,070 --> 00:08:03,199
so the science is ready i hope you're