



1
00:00:05,829 --> 00:00:03,990
okay hi everybody this is uh josh barley

2
00:00:07,909 --> 00:00:05,839
here inside mission control houston i am

3
00:00:10,790 --> 00:00:07,919
sitting here with uh doug huiglock an

4
00:00:14,150 --> 00:00:10,800
astronaut he flew back on sts-120 which

5
00:00:15,669 --> 00:00:14,160
was space shuttle discovery back in 2007

6
00:00:16,950 --> 00:00:15,679
performed a series of spacewalks and

7
00:00:19,750 --> 00:00:16,960
then he also became commander of the

8
00:00:23,029 --> 00:00:19,760
international space station back in 2010

9
00:00:24,230 --> 00:00:23,039
as part of expedition 25 so uh he's

10
00:00:25,670 --> 00:00:24,240
going to be happy to take your questions

11
00:00:27,349 --> 00:00:25,680
he's the smarter of the two of us so

12
00:00:28,550 --> 00:00:27,359
he'll probably be answering most of them

13
00:00:30,070 --> 00:00:28,560

so if you guys want to go ahead and get

14

00:00:31,750 --> 00:00:30,080

it kicked off we'll uh we'll be happy to

15

00:00:33,190 --> 00:00:31,760

talk with you

16

00:00:35,350 --> 00:00:33,200

great thank you

17

00:00:37,590 --> 00:00:35,360

go ahead

18

00:00:39,830 --> 00:00:37,600

hello today everybody there in acworth

19

00:00:40,790 --> 00:00:39,840

georgia i kind of missed that

20

00:00:43,030 --> 00:00:40,800

that

21

00:00:45,190 --> 00:00:43,040

part of the country i went to school

22

00:00:46,549 --> 00:00:45,200

did my graduate work at georgia tech so

23

00:00:48,869 --> 00:00:46,559

spent a little bit of time there in

24

00:00:50,790 --> 00:00:48,879

atlanta area so it's good to be talking

25

00:00:57,189 --> 00:00:50,800

to you today

26

00:01:03,750 --> 00:00:59,590

describe your spacewalk experience

27

00:01:06,390 --> 00:01:03,760

during the emergency shutdown of the iss

28

00:01:07,910 --> 00:01:06,400

pulling system were you afraid

29

00:01:11,990 --> 00:01:07,920

that's a great question what is your

30

00:01:16,630 --> 00:01:14,630

name is caitlin caitlin that's a great

31

00:01:18,789 --> 00:01:16,640

question caitlyn i get to actually get

32

00:01:20,630 --> 00:01:18,799

that question a lot from uh

33

00:01:23,910 --> 00:01:20,640

from kids because we're all kind of i'm

34

00:01:26,230 --> 00:01:23,920

a kid at heart as well myself but um

35

00:01:27,590 --> 00:01:26,240

you do fear you do you have some fears

36

00:01:29,190 --> 00:01:27,600

when you're when you're getting ready to

37

00:01:31,510 --> 00:01:29,200

do something like this because it wasn't

38

00:01:34,149 --> 00:01:31,520

something that we had trained for and so

39

00:01:36,230 --> 00:01:34,159

we had trained the skills that we needed

40

00:01:38,630 --> 00:01:36,240

to take outside to to change out this

41

00:01:40,630 --> 00:01:38,640

pump module that you were referring to

42

00:01:42,870 --> 00:01:40,640

um and we had worked together as a team

43

00:01:44,550 --> 00:01:42,880

before but we were facing something that

44

00:01:46,789 --> 00:01:44,560

was a little bit unknown for us that we

45

00:01:49,590 --> 00:01:46,799

hadn't had a chance to practice so

46

00:01:52,630 --> 00:01:49,600

so i wouldn't call it fear i i would say

47

00:01:55,350 --> 00:01:52,640

that you you manage that to where

48

00:01:56,870 --> 00:01:55,360

you you have to pull together as a team

49

00:01:58,389 --> 00:01:56,880

because everybody has their strengths

50

00:02:01,429 --> 00:01:58,399

and weaknesses much like you do in

51
00:02:03,350 --> 00:02:01,439
school when you're on a on a a team in

52
00:02:04,870 --> 00:02:03,360
school or a sports team or something

53
00:02:06,310 --> 00:02:04,880
like that

54
00:02:07,749 --> 00:02:06,320
when you're facing

55
00:02:09,669 --> 00:02:07,759
an objective

56
00:02:10,710 --> 00:02:09,679
that's impossible to overcome by

57
00:02:12,550 --> 00:02:10,720
yourself

58
00:02:15,110 --> 00:02:12,560
uh you have to pull together as a team

59
00:02:17,750 --> 00:02:15,120
and so so i think that we were i

60
00:02:20,150 --> 00:02:17,760
i call it heightened senses heightened

61
00:02:21,990 --> 00:02:20,160
sensitivity to what was going on and i

62
00:02:23,350 --> 00:02:22,000
was certainly aware that what we were

63
00:02:25,990 --> 00:02:23,360

doing was uh

64
00:02:28,790 --> 00:02:26,000
had some dangers out there and so we we

65
00:02:30,470 --> 00:02:28,800
managed those by talking about them and

66
00:02:32,390 --> 00:02:30,480
um discussing how we're going to

67
00:02:33,270 --> 00:02:32,400
overcome those things so

68
00:02:35,270 --> 00:02:33,280
um

69
00:02:37,030 --> 00:02:35,280
i was a little bit afraid i have to tell

70
00:02:38,949 --> 00:02:37,040
you that but

71
00:02:40,470 --> 00:02:38,959
but when i looked at our team and the

72
00:02:41,509 --> 00:02:40,480
team we'd put together here in mission

73
00:02:43,670 --> 00:02:41,519
control

74
00:02:45,910 --> 00:02:43,680
i knew that we were in capable hands

75
00:02:47,990 --> 00:02:45,920
with very very smart people that knew

76

00:02:50,229 --> 00:02:48,000

this equipment and so it helped us

77

00:02:51,430 --> 00:02:50,239

overcome our fears as a team and pull

78

00:02:53,350 --> 00:02:51,440

together and

79

00:03:02,830 --> 00:02:53,360

and really turn it into something uh

80

00:03:08,309 --> 00:03:05,990

experience are there emergency escape

81

00:03:10,710 --> 00:03:08,319

vehicles for the astronauts

82

00:03:12,949 --> 00:03:10,720

yes um there are emergency escape

83

00:03:15,270 --> 00:03:12,959

vehicles so we have we we call them

84

00:03:18,790 --> 00:03:15,280

lifeboats sometimes on the space station

85

00:03:19,990 --> 00:03:18,800

but we do have enough seats returned

86

00:03:20,710 --> 00:03:20,000

seats

87

00:03:28,789 --> 00:03:20,720

to

88

00:03:30,229 --> 00:03:28,799

over the past 10 years we've been our 10

89

00:03:31,270 --> 00:03:30,239

to 12 years we've been on the space

90

00:03:33,589 --> 00:03:31,280

station

91

00:03:35,990 --> 00:03:33,599

we have soyuz vehicles right now that

92

00:03:37,990 --> 00:03:36,000

are used as our lifeboats and so

93

00:03:39,430 --> 00:03:38,000

there are six crew members on board the

94

00:03:42,869 --> 00:03:39,440

space station

95

00:03:46,229 --> 00:03:42,879

in each soyuz vehicle soyuz capsule

96

00:03:48,149 --> 00:03:46,239

it's a russian designed spaceship each

97

00:03:50,949 --> 00:03:48,159

of those soyuz capsules

98

00:03:54,149 --> 00:03:50,959

has three seats and so um i think you

99

00:03:56,149 --> 00:03:54,159

can maybe see that on your screen the um

100

00:03:57,830 --> 00:03:56,159

so there is enough room for everybody to

101
00:04:04,229 --> 00:03:57,840
have a seat and a ride home if there's

102
00:04:07,509 --> 00:04:06,149
my name is winderburn and

103
00:04:09,270 --> 00:04:07,519
how do you feel about commercial

104
00:04:12,550 --> 00:04:09,280
airlines i mean

105
00:04:15,110 --> 00:04:12,560
space stations and the space x dragon i

106
00:04:16,310 --> 00:04:15,120
think the spacex dragon is awesome

107
00:04:18,310 --> 00:04:16,320
and uh

108
00:04:20,550 --> 00:04:18,320
and i think it's really really exciting

109
00:04:23,350 --> 00:04:20,560
because uh because we're beginning we're

110
00:04:25,909 --> 00:04:23,360
beginning to see like a an an

111
00:04:28,550 --> 00:04:25,919
increased interest and a resurgence in

112
00:04:30,150 --> 00:04:28,560
the commercial area of space and so

113
00:04:31,749 --> 00:04:30,160

and so um

114

00:04:33,430 --> 00:04:31,759

nasa is pretty good at pushing the

115

00:04:35,189 --> 00:04:33,440

boundaries and going to the next

116

00:04:36,790 --> 00:04:35,199

greatest thing and and we're we're

117

00:04:39,350 --> 00:04:36,800

planning that we're planning to go out

118

00:04:42,469 --> 00:04:39,360

beyond the space station now and so now

119

00:04:44,710 --> 00:04:42,479

with the uh with all with getting people

120

00:04:47,030 --> 00:04:44,720

and cargo back and forth from the space

121

00:04:49,350 --> 00:04:47,040

station we're going to rely more and

122

00:04:51,350 --> 00:04:49,360

more on these commercial vehicles which

123

00:04:53,590 --> 00:04:51,360

i think is wonderful and of course

124

00:04:55,909 --> 00:04:53,600

you've you may have been watching uh

125

00:04:58,310 --> 00:04:55,919

nasa tv or the news even with the with

126

00:05:00,390 --> 00:04:58,320

the spacex dragon that's now

127

00:05:02,390 --> 00:05:00,400

attached to the space station and i

128

00:05:03,189 --> 00:05:02,400

think you can see a picture of it there

129

00:05:05,510 --> 00:05:03,199

and

130

00:05:07,430 --> 00:05:05,520

it's i think it's very very exciting

131

00:05:10,950 --> 00:05:07,440

because we're beginning to see

132

00:05:14,310 --> 00:05:10,960

increased interest in the commercial

133

00:05:17,029 --> 00:05:14,320

area of space and and space transports

134

00:05:19,830 --> 00:05:17,039

uh supplying uh the space station

135

00:05:21,830 --> 00:05:19,840

and eventually transport of of humans

136

00:05:23,830 --> 00:05:21,840

back and forth to the space station i

137

00:05:25,110 --> 00:05:23,840

think it's very exciting and i think

138

00:05:27,430 --> 00:05:25,120

you're going to see

139

00:05:29,350 --> 00:05:27,440

it's a really great very exciting time

140

00:05:30,629 --> 00:05:29,360

for you kids that are in school now

141

00:05:32,550 --> 00:05:30,639

because i think you're going to be

142

00:05:34,710 --> 00:05:32,560

seeing an increased interest

143

00:05:37,590 --> 00:05:34,720

in in both your uh the curriculum that

144

00:05:39,590 --> 00:05:37,600

you see in school and also a better and

145

00:05:42,310 --> 00:05:39,600

tighter connection between our

146

00:05:44,710 --> 00:05:42,320

commercial companies and our education

147

00:05:46,469 --> 00:05:44,720

uh department as well so you may see

148

00:05:48,390 --> 00:05:46,479

some additional uh things coming into

149

00:05:49,909 --> 00:05:48,400

the schools uh and from the commercial

150

00:05:53,749 --> 00:05:49,919

base as well so i think it's very

151

00:05:58,550 --> 00:05:56,309

what is the american astronomical

152

00:06:00,469 --> 00:05:58,560

society flight achievement and what did

153

00:06:02,870 --> 00:06:00,479

you do to deserve it

154

00:06:05,350 --> 00:06:02,880

oh that was an award you probably saw it

155

00:06:08,469 --> 00:06:05,360

probably saw it on my bio but it was a

156

00:06:09,430 --> 00:06:08,479

it was an award um that's a society that

157

00:06:11,670 --> 00:06:09,440

um

158

00:06:14,629 --> 00:06:11,680

uh

159

00:06:15,270 --> 00:06:14,639

focuses on space and space exploration

160

00:06:21,510 --> 00:06:15,280

and

161

00:06:24,230 --> 00:06:21,520

to get there

162

00:06:26,790 --> 00:06:24,240

and back in 2007 we had

163

00:06:28,950 --> 00:06:26,800

i was on board the station on i flew up

164

00:06:32,950 --> 00:06:28,960
on the space shuttle discovery

165

00:06:35,270 --> 00:06:32,960
and we had um a torn solar array we

166

00:06:37,510 --> 00:06:35,280
tried to deploy the solar array that we

167

00:06:38,790 --> 00:06:37,520
moved from one part of the station to

168

00:06:42,150 --> 00:06:38,800
another

169

00:06:45,110 --> 00:06:42,160
and um when we went to deploy it it tore

170

00:06:46,550 --> 00:06:45,120
much like a like a piece of paper almost

171

00:06:48,550 --> 00:06:46,560
and we were worried that it was going to

172

00:06:50,790 --> 00:06:48,560
tear completely in half

173

00:06:53,670 --> 00:06:50,800
and so rather than

174

00:06:56,710 --> 00:06:53,680
continue to deploy process we stopped it

175

00:06:58,309 --> 00:06:56,720
and we built actually like stitches you

176
00:07:00,309 --> 00:06:58,319
may have some of you there in the room

177
00:07:02,550 --> 00:07:00,319
may have had stitches before in your

178
00:07:05,589 --> 00:07:02,560
skin you just kind of sew something up

179
00:07:08,870 --> 00:07:05,599
or sewing a piece of material

180
00:07:11,270 --> 00:07:08,880
we we made stitches inside of the we

181
00:07:13,430 --> 00:07:11,280
took whatever material we could find and

182
00:07:15,589 --> 00:07:13,440
our mission control team helped us find

183
00:07:16,469 --> 00:07:15,599
locate those things on board the space

184
00:07:18,150 --> 00:07:16,479
station

185
00:07:20,710 --> 00:07:18,160
we made these stitches and we went

186
00:07:22,390 --> 00:07:20,720
outside and we sewed up the solar array

187
00:07:25,110 --> 00:07:22,400
and so um

188
00:07:27,670 --> 00:07:25,120

so when we got back uh it was it was

189

00:07:29,830 --> 00:07:27,680

pretty daring feat and of course for us

190

00:07:31,990 --> 00:07:29,840

on board the space station we just did

191

00:07:34,950 --> 00:07:32,000

like we were told and we had the really

192

00:07:37,430 --> 00:07:34,960

really smart and very very uh

193

00:07:38,309 --> 00:07:37,440

creative people here on the ground that

194

00:07:40,230 --> 00:07:38,319

um

195

00:07:42,309 --> 00:07:40,240

that came up with this solution and so

196

00:07:43,990 --> 00:07:42,319

they helped us build these things and we

197

00:07:45,189 --> 00:07:44,000

fixed that and so when we got back to

198

00:07:45,909 --> 00:07:45,199

earth

199

00:07:49,029 --> 00:07:45,919

the

200

00:07:52,230 --> 00:07:49,039

astronomical society

201

00:07:55,189 --> 00:07:52,240

issued an award to our eva team

202

00:07:58,070 --> 00:07:55,199

for the repair of this solar array so

203

00:07:59,909 --> 00:07:58,080

thank you

204

00:08:01,990 --> 00:07:59,919

are you going to be part of the mars

205

00:08:04,390 --> 00:08:02,000

mission

206

00:08:06,869 --> 00:08:04,400

well i'll probably be too old but what's

207

00:08:09,270 --> 00:08:06,879

exciting is um uh you know i think we

208

00:08:12,150 --> 00:08:09,280

we're we're hoping to go to mars

209

00:08:14,869 --> 00:08:12,160

what maybe 25 or 30 years something like

210

00:08:16,869 --> 00:08:14,879

that um i'm hoping that we'll see i'm

211

00:08:18,629 --> 00:08:16,879

hoping i'm i'll probably be in a rocking

212

00:08:20,469 --> 00:08:18,639

chair with a glass of

213

00:08:22,390 --> 00:08:20,479

sweet tea or something somewhere

214

00:08:24,550 --> 00:08:22,400

watching but what's very exciting i

215

00:08:26,950 --> 00:08:24,560

think about usually astronauts when

216

00:08:29,270 --> 00:08:26,960

they're selected to fly in space

217

00:08:31,029 --> 00:08:29,280

they're usually in their 30s maybe like

218

00:08:32,790 --> 00:08:31,039

mid 30s or something like that so you

219

00:08:35,829 --> 00:08:32,800

know what's very exciting

220

00:08:37,269 --> 00:08:35,839

is that the first people that we'll see

221

00:08:40,149 --> 00:08:37,279

on mars

222

00:08:42,630 --> 00:08:40,159

are probably somewhere in our classrooms

223

00:08:44,710 --> 00:08:42,640

right now maybe somebody there in the

224

00:08:46,630 --> 00:08:44,720

classroom you're sitting in right now

225

00:08:49,350 --> 00:08:46,640

maybe somebody in that very room will be

226

00:08:51,350 --> 00:08:49,360

the first person that we'll see

227

00:08:53,509 --> 00:08:51,360

on the surface of mars and that that's

228

00:08:56,790 --> 00:08:53,519

very exciting to me you know thinking

229

00:08:58,070 --> 00:08:56,800

that maybe 25 or 30 years in the future

230

00:08:59,509 --> 00:08:58,080

that maybe right there where you're

231

00:09:00,389 --> 00:08:59,519

sitting there's an astronaut in that

232

00:09:02,310 --> 00:09:00,399

room

233

00:09:04,630 --> 00:09:02,320

and you'll be sitting here 30 years from

234

00:09:06,150 --> 00:09:04,640

now and i'll be in my rocking chair and

235

00:09:10,230 --> 00:09:06,160

listening to you tell the story about

236

00:09:15,430 --> 00:09:12,230

that sounds good

237

00:09:17,750 --> 00:09:15,440

how have 178 days in outer space affect

238

00:09:20,550 --> 00:09:17,760

your body your health oh that's a really

239

00:09:22,310 --> 00:09:20,560

good question 178 days in space there

240

00:09:26,070 --> 00:09:22,320

are a lot of there are some things that

241

00:09:28,230 --> 00:09:26,080

i was anticipating and i expected

242

00:09:30,630 --> 00:09:28,240

your your a little bit your vestibular

243

00:09:32,710 --> 00:09:30,640

system that kind of helps you balance

244

00:09:35,269 --> 00:09:32,720

while you're standing up was was

245

00:09:37,110 --> 00:09:35,279

affected and i was expecting that

246

00:09:39,269 --> 00:09:37,120

i was expecting a little bit of you know

247

00:09:41,509 --> 00:09:39,279

a little bit of queasiness in my stomach

248

00:09:43,590 --> 00:09:41,519

when when i got you back used to gravity

249

00:09:45,910 --> 00:09:43,600

and and i i had a little bit of that and

250

00:09:48,310 --> 00:09:45,920

i expected that but there were some

251

00:09:50,310 --> 00:09:48,320

things that i didn't really expect one

252

00:09:53,670 --> 00:09:50,320

one my vision changed a little bit you

253

00:09:56,310 --> 00:09:53,680

may have talked in your classrooms about

254

00:09:57,509 --> 00:09:56,320

the effect long long term effects on

255

00:09:59,829 --> 00:09:57,519

vision

256

00:10:01,590 --> 00:09:59,839

for long duration space flight and it's

257

00:10:03,750 --> 00:10:01,600

an interesting phenomena that we're

258

00:10:05,750 --> 00:10:03,760

still trying to understand in the

259

00:10:08,790 --> 00:10:05,760

medical field and

260

00:10:10,870 --> 00:10:08,800

essentially the mechanism there is your

261

00:10:12,710 --> 00:10:10,880

fluid shifts in your body and i had like

262

00:10:15,590 --> 00:10:12,720

increased pressure

263

00:10:17,430 --> 00:10:15,600

inside of my head and when you have that

264

00:10:19,269 --> 00:10:17,440

increased pressure

265

00:10:20,790 --> 00:10:19,279

it pushes on the back of your eyes and

266

00:10:21,990 --> 00:10:20,800

actually affects your optic nerve as

267

00:10:24,230 --> 00:10:22,000

well and so

268

00:10:26,389 --> 00:10:24,240

so we didn't i didn't really expect that

269

00:10:28,069 --> 00:10:26,399

and then and now so it's been it's sort

270

00:10:29,350 --> 00:10:28,079

of a new avenue that we're looking at

271

00:10:31,590 --> 00:10:29,360

medically

272

00:10:33,110 --> 00:10:31,600

to fly long duration in space

273

00:10:35,269 --> 00:10:33,120

another thing that was really surprising

274

00:10:36,949 --> 00:10:35,279

it was actually kind of funny was when

275

00:10:38,150 --> 00:10:36,959

you're on the space station everything

276
00:10:41,030 --> 00:10:38,160
is floating

277
00:10:41,990 --> 00:10:41,040
and so you have very little reference

278
00:10:43,910 --> 00:10:42,000
for like

279
00:10:45,910 --> 00:10:43,920
speeds like different kinds of speeds

280
00:10:47,829 --> 00:10:45,920
and things so like when you're driving

281
00:10:50,069 --> 00:10:47,839
or even when you're out walking or

282
00:10:51,030 --> 00:10:50,079
riding a bike or something like that you

283
00:10:53,190 --> 00:10:51,040
have

284
00:10:54,710 --> 00:10:53,200
other people that are walking maybe the

285
00:10:55,829 --> 00:10:54,720
other direction or people that are

286
00:10:57,509 --> 00:10:55,839
crossing

287
00:10:59,190 --> 00:10:57,519
and of course when we're driving we have

288
00:11:00,870 --> 00:10:59,200

stop lights and stop signs and things

289

00:11:03,110 --> 00:11:00,880

and you have vehicles that are coming in

290

00:11:06,150 --> 00:11:03,120

the other way and going and there and

291

00:11:07,829 --> 00:11:06,160

everybody's at a different speed and so

292

00:11:10,230 --> 00:11:07,839

your brain gets used to everything

293

00:11:12,710 --> 00:11:10,240

floating so when you come back after six

294

00:11:14,710 --> 00:11:12,720

months it's really hard for your brain

295

00:11:17,750 --> 00:11:14,720

to kind of

296

00:11:19,750 --> 00:11:17,760

regain that that ability to understand

297

00:11:21,509 --> 00:11:19,760

like closure rates and opening rates

298

00:11:23,350 --> 00:11:21,519

when you're say when you're driving they

299

00:11:25,030 --> 00:11:23,360

don't let us drive for about 45 days

300

00:11:28,310 --> 00:11:25,040

which is really really good

301
00:11:30,470 --> 00:11:28,320
so but um but i remember even even 60

302
00:11:32,710 --> 00:11:30,480
days after i landed when i first started

303
00:11:35,190 --> 00:11:32,720
to drive a vehicle and i

304
00:11:37,990 --> 00:11:35,200
my daughter was sitting beside me and um

305
00:11:39,829 --> 00:11:38,000
and i saw a red light about uh maybe a

306
00:11:41,910 --> 00:11:39,839
quarter or half a mile up in front of me

307
00:11:43,269 --> 00:11:41,920
and i i quickly tapped the brakes and

308
00:11:45,350 --> 00:11:43,279
she said dad what are you doing and i

309
00:11:47,430 --> 00:11:45,360
said well i got a red light she goes but

310
00:11:48,630 --> 00:11:47,440
it's like a mile away you know so

311
00:11:50,710 --> 00:11:48,640
but on the space station you're

312
00:11:52,710 --> 00:11:50,720
traveling so fast and and things are

313
00:11:54,230 --> 00:11:52,720

floating inside that it's hard to get

314

00:11:56,790 --> 00:11:54,240

that relative

315

00:11:58,230 --> 00:11:56,800

speed sense of speed and so uh so that

316

00:11:59,509 --> 00:11:58,240

was an interesting phenomena that

317

00:12:01,269 --> 00:11:59,519

happens to your body when you're in

318

00:12:04,069 --> 00:12:01,279

space

319

00:12:07,030 --> 00:12:04,079

is that why you wear glasses

320

00:12:08,150 --> 00:12:07,040

yes actually i wear these now uh there's

321

00:12:10,550 --> 00:12:08,160

probably some people in the room that

322

00:12:12,310 --> 00:12:10,560

wear glasses i wear these now

323

00:12:14,550 --> 00:12:12,320

they help me read but when i got back

324

00:12:16,389 --> 00:12:14,560

from space

325

00:12:20,629 --> 00:12:16,399

the

326

00:12:23,269 --> 00:12:20,639

everything for me everything was just a

327

00:12:25,269 --> 00:12:23,279

little slightly out of focus and so um

328

00:12:27,110 --> 00:12:25,279

so now i wear these do i look good in

329

00:12:28,150 --> 00:12:27,120

them

330

00:12:29,509 --> 00:12:28,160

so

331

00:12:33,269 --> 00:12:29,519

thank you

332

00:12:35,750 --> 00:12:33,279

unfortunately um all the things that we

333

00:12:38,790 --> 00:12:35,760

do in space you can do with glasses on

334

00:12:40,629 --> 00:12:38,800

so so it's it's not that uh not that

335

00:12:42,310 --> 00:12:40,639

difficult to adapt to

336

00:12:44,389 --> 00:12:42,320

um but uh

337

00:12:46,310 --> 00:12:44,399

but it's hard for it was hard for me to

338

00:12:47,990 --> 00:12:46,320

kind of refocus uh

339

00:12:49,030 --> 00:12:48,000

visually and it took me about a year and

340

00:12:51,269 --> 00:12:49,040

a half

341

00:12:52,470 --> 00:12:51,279

for my vision to come back to where it

342

00:12:54,310 --> 00:12:52,480

was stable

343

00:12:56,550 --> 00:12:54,320

and it didn't come all the way back but

344

00:12:58,550 --> 00:12:56,560

it did have some effects and i i

345

00:12:59,509 --> 00:12:58,560

actually was very happy that i was able

346

00:13:07,110 --> 00:12:59,519

to

347

00:13:09,829 --> 00:13:07,120

here at at nasa and also uh

348

00:13:11,590 --> 00:13:09,839

across our nation and acro and globally

349

00:13:14,230 --> 00:13:11,600

you know to help us understand this

350

00:13:15,509 --> 00:13:14,240

phenomenon so when we send like somebody

351

00:13:17,990 --> 00:13:15,519

sitting in that room that's going to go

352

00:13:21,110 --> 00:13:18,000

to mars first person to mars that may be

353

00:13:22,150 --> 00:13:21,120

a three-year trip out into space and

354

00:13:22,949 --> 00:13:22,160

back

355

00:13:27,350 --> 00:13:22,959

and

356

00:13:29,750 --> 00:13:27,360

vision

357

00:13:31,509 --> 00:13:29,760

changes with only six months in space

358

00:13:33,509 --> 00:13:31,519

maybe we really need to take a hard look

359

00:13:34,389 --> 00:13:33,519

at this and so so i feel like i've

360

00:13:38,870 --> 00:13:34,399

contributed

361

00:13:40,949 --> 00:13:38,880

thank you

362

00:13:41,990 --> 00:13:40,959

how does space travel affect the aging

363

00:13:46,629 --> 00:13:42,000

process

364

00:13:48,230 --> 00:13:46,639

well uh there is a fountain of youth out

365

00:13:49,509 --> 00:13:48,240

there

366

00:13:51,990 --> 00:13:49,519

the

367

00:13:54,790 --> 00:13:52,000

well interestingly enough um

368

00:13:57,350 --> 00:13:54,800

in some ways it makes you feel

369

00:13:58,870 --> 00:13:57,360

it makes you feel a little younger

370

00:14:01,189 --> 00:13:58,880

because you don't have

371

00:14:02,470 --> 00:14:01,199

you don't have gravity now so you you

372

00:14:03,829 --> 00:14:02,480

sleep better

373

00:14:05,030 --> 00:14:03,839

i think because you don't have pressure

374

00:14:06,150 --> 00:14:05,040

points now

375

00:14:08,790 --> 00:14:06,160

you don't

376

00:14:10,150 --> 00:14:08,800

i very rarely get a sore back or a sore

377

00:14:11,910 --> 00:14:10,160

neck or something like that because

378

00:14:13,509 --> 00:14:11,920

you're you're kind of floating the

379

00:14:15,350 --> 00:14:13,519

sensation is like

380

00:14:17,990 --> 00:14:15,360

if you've ever been in a swimming pool

381

00:14:19,910 --> 00:14:18,000

like a nice warm swimming pool and you

382

00:14:22,230 --> 00:14:19,920

just kind of close your eyes and just

383

00:14:23,269 --> 00:14:22,240

float that feeling that's what it feels

384

00:14:25,990 --> 00:14:23,279

like

385

00:14:28,629 --> 00:14:26,000

all day every day in space and so so

386

00:14:31,030 --> 00:14:28,639

that process i think it helps your body

387

00:14:32,629 --> 00:14:31,040

relax a little bit so i don't

388

00:14:34,710 --> 00:14:32,639

i don't think it makes you get any

389

00:14:36,389 --> 00:14:34,720

younger but it certainly like reduces a

390

00:14:38,230 --> 00:14:36,399

little bit of the stresses normally that

391

00:14:40,949 --> 00:14:38,240

you'd face on your body now

392

00:14:43,509 --> 00:14:40,959

there are some ways that actually

393

00:14:45,269 --> 00:14:43,519

that sort of accelerate certain things

394

00:14:47,590 --> 00:14:45,279

in the aging process and one of those

395

00:14:49,590 --> 00:14:47,600

things that we're really looking hard at

396

00:14:51,910 --> 00:14:49,600

is bone loss you know bone

397

00:14:52,790 --> 00:14:51,920

demineralization and stuff like this

398

00:14:56,069 --> 00:14:52,800

where

399

00:14:57,670 --> 00:14:56,079

we it speeds up the process of of uh

400

00:15:00,069 --> 00:14:57,680

breakdown of bone structure and of

401
00:15:01,990 --> 00:15:00,079
course we're trying to develop

402
00:15:03,189 --> 00:15:02,000
exercises and things like that that we

403
00:15:05,430 --> 00:15:03,199
can do

404
00:15:07,030 --> 00:15:05,440
that will help us kind of stave off the

405
00:15:09,430 --> 00:15:07,040
loss of bone

406
00:15:11,910 --> 00:15:09,440
density and things like that and so so

407
00:15:13,670 --> 00:15:11,920
in those kind of processes

408
00:15:16,389 --> 00:15:13,680
like bone loss

409
00:15:19,110 --> 00:15:16,399
the aging the aging process is sort of

410
00:15:21,030 --> 00:15:19,120
sped up a little bit artificially

411
00:15:22,310 --> 00:15:21,040
but that helps us medically because we

412
00:15:24,629 --> 00:15:22,320
can actually

413
00:15:27,990 --> 00:15:24,639

use the astronaut that's experiencing

414

00:15:29,829 --> 00:15:28,000

bone loss sort of like someone has like

415

00:15:31,749 --> 00:15:29,839

maybe like osteoporosis or something

416

00:15:34,470 --> 00:15:31,759

like that that actually has bone loss

417

00:15:36,870 --> 00:15:34,480

here on earth we can actually use the

418

00:15:38,389 --> 00:15:36,880

astronauts in studies and science

419

00:15:41,430 --> 00:15:38,399

experiments to

420

00:15:44,150 --> 00:15:41,440

to try to help us understand how that

421

00:15:46,710 --> 00:15:44,160

process takes place and how to how to

422

00:15:48,790 --> 00:15:46,720

treat people here on earth as well so

423

00:15:50,870 --> 00:15:48,800

so it's all part of the the science that

424

00:15:52,470 --> 00:15:50,880

we're gaining on board the station you

425

00:15:54,870 --> 00:15:52,480

do get a little bit taller though yes

426
00:15:56,470 --> 00:15:54,880
you do you do actually because of that

427
00:15:57,670 --> 00:15:56,480
you know we have gravity pulling us down

428
00:15:59,749 --> 00:15:57,680
to the ground so when you're standing up

429
00:16:01,430 --> 00:15:59,759
right here on earth you have you you're

430
00:16:03,350 --> 00:16:01,440
stuck your feet feel like you're you're

431
00:16:04,870 --> 00:16:03,360
probably sitting in chairs right now so

432
00:16:07,030 --> 00:16:04,880
so you think about it and you're you're

433
00:16:08,710 --> 00:16:07,040
just kind of stuck to the bottom of your

434
00:16:10,629 --> 00:16:08,720
chair and so you actually your spine is

435
00:16:12,870 --> 00:16:10,639
compressed a little bit so when you go

436
00:16:14,470 --> 00:16:12,880
to space and you remove gravity your

437
00:16:15,910 --> 00:16:14,480
body kind of stretches out a little bit

438
00:16:17,749 --> 00:16:15,920

and yeah i actually grew about an inch

439

00:16:19,749 --> 00:16:17,759

and a half when i was in space i'd take

440

00:16:21,110 --> 00:16:19,759

that of course yeah but i wasn't able to

441

00:16:24,550 --> 00:16:21,120

keep that when i got back when i got

442

00:16:27,509 --> 00:16:24,560

back i i after about 15 days i shrunk

443

00:16:28,870 --> 00:16:27,519

down to my normal size so

444

00:16:31,590 --> 00:16:28,880

amazing

445

00:16:34,230 --> 00:16:31,600

why did you choose georgia tech to study

446

00:16:40,310 --> 00:16:34,240

aerospace engineering because i love

447

00:16:45,590 --> 00:16:42,310

do we have any tech any tech fans there

448

00:16:50,550 --> 00:16:47,269

awesome awesome

449

00:16:52,470 --> 00:16:50,560

well i i the reason i chose georgia tech

450

00:16:54,310 --> 00:16:52,480

um for the at the period of time they

451
00:16:55,910 --> 00:16:54,320
were georgia tech was a center of

452
00:16:58,470 --> 00:16:55,920
excellence for

453
00:17:00,470 --> 00:16:58,480
for rotary wing uh technology an

454
00:17:03,030 --> 00:17:00,480
aerospace field and and

455
00:17:05,189 --> 00:17:03,040
at the time i was an active duty army

456
00:17:08,549 --> 00:17:05,199
pilot and so

457
00:17:11,270 --> 00:17:08,559
the army sent me there to study

458
00:17:12,309 --> 00:17:11,280
rotorcraft our helicopters and vertical

459
00:17:14,309 --> 00:17:12,319
lift

460
00:17:15,909 --> 00:17:14,319
technology and so

461
00:17:18,549 --> 00:17:15,919
and so i don't know if you knew this but

462
00:17:20,870 --> 00:17:18,559
georgia tech is a center of excellence

463
00:17:22,630 --> 00:17:20,880

for rotary wing technology and vertical

464

00:17:25,510 --> 00:17:22,640

lift technology so

465

00:17:26,630 --> 00:17:25,520

so a lot of my um my thoughts on how

466

00:17:32,070 --> 00:17:26,640

making

467

00:17:33,029 --> 00:17:32,080

can that can maneuver like a helicopter

468

00:17:35,430 --> 00:17:33,039

or

469

00:17:37,430 --> 00:17:35,440

aircraft like a helicopter maneuvering

470

00:17:38,230 --> 00:17:37,440

or some sort of hovercraft

471

00:17:39,830 --> 00:17:38,240

um

472

00:17:41,350 --> 00:17:39,840

georgia tech is a center of excellence

473

00:17:42,630 --> 00:17:41,360

for that so that's why i chose georgia

474

00:17:47,350 --> 00:17:42,640

tech

475

00:17:48,710 --> 00:17:47,360

and besides they're the ramblin wreck

476

00:17:51,190 --> 00:17:48,720

there's probably some georgia fans in

477

00:17:51,990 --> 00:17:51,200

the room that are not smiling right now

478

00:17:53,029 --> 00:17:52,000

oh

479

00:17:55,430 --> 00:17:53,039

a few

480

00:18:00,789 --> 00:17:57,909

go ahead tori in your bio it said that

481

00:18:03,029 --> 00:18:00,799

you got the russian medal of marriage

482

00:18:04,390 --> 00:18:03,039

what did you do to get that

483

00:18:06,150 --> 00:18:04,400

well that was actually you know that was

484

00:18:08,470 --> 00:18:06,160

actually kind of a surprise and when

485

00:18:10,150 --> 00:18:08,480

that medal was awarded to me it was by

486

00:18:12,310 --> 00:18:10,160

given to me by the

487

00:18:15,029 --> 00:18:12,320

russian ambassador to the u.s which was

488

00:18:17,909 --> 00:18:15,039

really cool and so um

489

00:18:20,710 --> 00:18:17,919

but i participated and when i launched

490

00:18:23,669 --> 00:18:20,720

the space in 2010 i launched on a

491

00:18:25,830 --> 00:18:23,679

russian soyuz rocket and so i went to

492

00:18:27,350 --> 00:18:25,840

space and operated

493

00:18:29,590 --> 00:18:27,360

in this

494

00:18:32,390 --> 00:18:29,600

russian spaceship and then came home in

495

00:18:34,470 --> 00:18:32,400

that very same capsule and so and and of

496

00:18:36,310 --> 00:18:34,480

course in order to get a chance to do

497

00:18:37,669 --> 00:18:36,320

that you go through a lot of training

498

00:18:40,870 --> 00:18:37,679

and a lot of um

499

00:18:43,909 --> 00:18:40,880

uh integrated training and um

500

00:18:46,310 --> 00:18:43,919

and uh and uh study with the russians

501
00:18:48,710 --> 00:18:46,320
and with the russian space agency and

502
00:18:50,950 --> 00:18:48,720
also with their uh with their great

503
00:18:54,789 --> 00:18:50,960
engineers over there and everything so

504
00:18:56,789 --> 00:18:54,799
so it was sort of a uh uh a medal that

505
00:18:59,909 --> 00:18:56,799
was given to those astronauts that had

506
00:19:01,909 --> 00:18:59,919
done work uh preparing to fly on the

507
00:19:03,909 --> 00:19:01,919
soyuz vehicle and then completing a

508
00:19:05,990 --> 00:19:03,919
flight on the vehicle so

509
00:19:08,390 --> 00:19:06,000
so uh i i just

510
00:19:10,630 --> 00:19:08,400
i studied i learned my russian which was

511
00:19:12,549 --> 00:19:10,640
hard for me probably i mean that's

512
00:19:14,630 --> 00:19:12,559
probably the hardest thing uh that i had

513
00:19:16,470 --> 00:19:14,640

to do is learn russian it was really

514

00:19:18,630 --> 00:19:16,480

difficult for me but um

515

00:19:20,789 --> 00:19:18,640

uh but learning that system and flying

516

00:19:22,310 --> 00:19:20,799

on that vehicle and and that's the

517

00:19:24,710 --> 00:19:22,320

reason they gave me that medal and i was

518

00:19:27,510 --> 00:19:24,720

very honored

519

00:19:29,510 --> 00:19:27,520

excellent great go ahead okay how is it

520

00:19:31,510 --> 00:19:29,520

similar to live underwater compared to

521

00:19:33,510 --> 00:19:31,520

space

522

00:19:35,990 --> 00:19:33,520

a very very similar underwater you know

523

00:19:38,870 --> 00:19:36,000

we you probably have seen we do our

524

00:19:40,710 --> 00:19:38,880

space walk training underwater

525

00:19:43,909 --> 00:19:40,720

we also have

526
00:19:46,470 --> 00:19:43,919
this

527
00:19:48,390 --> 00:19:46,480
extreme environments training that we

528
00:19:51,830 --> 00:19:48,400
where we are in the aquarius habitat

529
00:19:53,510 --> 00:19:51,840
underwater because you can take in

530
00:19:56,230 --> 00:19:53,520
underwater you can

531
00:19:59,350 --> 00:19:56,240
sort of replicate what it feels like in

532
00:20:01,430 --> 00:19:59,360
space now it's actually much easier to

533
00:20:03,909 --> 00:20:01,440
live and work in space and out on a

534
00:20:05,190 --> 00:20:03,919
spacewalk in space than it is in the

535
00:20:07,990 --> 00:20:05,200
pool

536
00:20:11,110 --> 00:20:08,000
can

537
00:20:13,990 --> 00:20:11,120
most assuredly do it in space and so

538
00:20:15,750 --> 00:20:14,000

we we in the pool we actually

539

00:20:17,830 --> 00:20:15,760

uh go down to the level where we're

540

00:20:20,549 --> 00:20:17,840

gonna work in these in our big suits and

541

00:20:22,390 --> 00:20:20,559

they get us neutrally buoyant so it

542

00:20:25,669 --> 00:20:22,400

feels like you're floating

543

00:20:27,669 --> 00:20:25,679

so they they add weights or foam to your

544

00:20:29,830 --> 00:20:27,679

to your suit and so they they hold you

545

00:20:31,590 --> 00:20:29,840

out and so you don't rise to the surface

546

00:20:34,549 --> 00:20:31,600

and you don't drop to the bottom so they

547

00:20:36,789 --> 00:20:34,559

get you what's called neutrally buoyant

548

00:20:39,510 --> 00:20:36,799

and that pool is actually in a place we

549

00:20:41,590 --> 00:20:39,520

call the neutral buoyancy laboratory

550

00:20:43,430 --> 00:20:41,600

which is right outside of johnson space

551
00:20:45,750 --> 00:20:43,440
center here in houston we do all of our

552
00:20:48,789 --> 00:20:45,760
spacewalk training there and because

553
00:20:51,110 --> 00:20:48,799
it's a great analogy to to floating

554
00:20:53,350 --> 00:20:51,120
around in space and of course in the

555
00:20:55,190 --> 00:20:53,360
pool you still have gravity so if you

556
00:20:57,510 --> 00:20:55,200
turn on your in your suit if you turn on

557
00:20:59,990 --> 00:20:57,520
your head in the pool you you can feel

558
00:21:01,029 --> 00:21:00,000
that you can so it doesn't feel real

559
00:21:02,710 --> 00:21:01,039
comfortable it feels like you're

560
00:21:04,630 --> 00:21:02,720
standing on your head and so you still

561
00:21:07,029 --> 00:21:04,640
have that feeling in the pool

562
00:21:08,950 --> 00:21:07,039
and you also have drag so when you move

563
00:21:10,630 --> 00:21:08,960

your arm through the water

564

00:21:12,710 --> 00:21:10,640

you have you can feel the drag of the

565

00:21:14,870 --> 00:21:12,720

water on on your arms and when you're

566

00:21:16,630 --> 00:21:14,880

trying to move your body and stuff so

567

00:21:18,630 --> 00:21:16,640

but when you get the space all of that

568

00:21:20,630 --> 00:21:18,640

is gone and so it's actually much easier

569

00:21:23,190 --> 00:21:20,640

to move around in space so

570

00:21:28,390 --> 00:21:23,200

it's a great analogy that we use to

571

00:21:33,110 --> 00:21:30,630

does curiosity's memory glitch affect

572

00:21:35,510 --> 00:21:33,120

your current data

573

00:21:37,190 --> 00:21:35,520

um well i i'm not privy to all that data

574

00:21:40,149 --> 00:21:37,200

but uh um

575

00:21:41,510 --> 00:21:40,159

i i'm sure that a memory glitch probably

576

00:21:45,029 --> 00:21:41,520

did

577

00:21:47,350 --> 00:21:45,039

the data we were bringing down or

578

00:21:49,590 --> 00:21:47,360

gathering and then also telemetering

579

00:21:51,909 --> 00:21:49,600

back to earth uh but i believe that

580

00:21:53,830 --> 00:21:51,919

they've solved that uh that issue now i

581

00:21:55,830 --> 00:21:53,840

i don't really have that all the details

582

00:21:57,590 --> 00:21:55,840

on that but

583

00:21:59,110 --> 00:21:57,600

what we usually do in our spaceships

584

00:22:01,430 --> 00:21:59,120

like this and i believe was the case

585

00:22:04,789 --> 00:22:01,440

with curiosity that we we build in some

586

00:22:07,029 --> 00:22:04,799

redundancy um so we can we can actually

587

00:22:09,990 --> 00:22:07,039

like swap to a different channel or a

588

00:22:12,470 --> 00:22:10,000

different string and then and then

589

00:22:14,789 --> 00:22:12,480

kind of try to fix or repair the the

590

00:22:17,750 --> 00:22:14,799

string that we had a glitch on and so i

591

00:22:18,630 --> 00:22:17,760

really don't know the details on that um

592

00:22:21,510 --> 00:22:18,640

uh

593

00:22:23,590 --> 00:22:21,520

but um i the last i heard that we were

594

00:22:25,110 --> 00:22:23,600

we've gotten back full functionality of

595

00:22:26,630 --> 00:22:25,120

our of our data so yeah one of the cool

596

00:22:27,909 --> 00:22:26,640

things about working at nasa is that

597

00:22:29,990 --> 00:22:27,919

there's different centers across the

598

00:22:31,990 --> 00:22:30,000

united states so there's some in

599

00:22:33,190 --> 00:22:32,000

alabama some in mississippi and out in

600

00:22:34,470 --> 00:22:33,200

california there's a place called the

601
00:22:36,230 --> 00:22:34,480
jet propulsion laboratory and that's

602
00:22:37,990 --> 00:22:36,240
sort of the home of all the mars rovers

603
00:22:39,830 --> 00:22:38,000
including curiosity so

604
00:22:41,110 --> 00:22:39,840
there's a room sort of a mini mission

605
00:22:43,270 --> 00:22:41,120
control out there that's where they

606
00:22:44,710 --> 00:22:43,280
actually drive and get the data down

607
00:22:47,029 --> 00:22:44,720
from curiosity so those guys are out

608
00:22:50,789 --> 00:22:47,039
there watching that uh 24 hours a day

609
00:22:56,549 --> 00:22:54,390
what foreign languages do you speak

610
00:22:59,190 --> 00:22:56,559
well um

611
00:23:01,190 --> 00:22:59,200
i did speak pretty good russian but it's

612
00:23:03,029 --> 00:23:01,200
it's kind of um you know when you don't

613
00:23:05,270 --> 00:23:03,039

practice it i don't know how many there

614

00:23:07,430 --> 00:23:05,280

in the room speak a foreign language but

615

00:23:09,909 --> 00:23:07,440

you know if you don't keep practiced at

616

00:23:12,390 --> 00:23:09,919

it it's difficult to keep that

617

00:23:15,029 --> 00:23:12,400

to keep that cutting edge you know so um

618

00:23:16,070 --> 00:23:15,039

i would say right now i speak english

619

00:23:18,630 --> 00:23:16,080

and uh

620

00:23:20,630 --> 00:23:18,640

and i speak a little bit of russian

621

00:23:23,110 --> 00:23:20,640

enough to get by i think i think i could

622

00:23:24,870 --> 00:23:23,120

survive you know on on the street and if

623

00:23:27,590 --> 00:23:24,880

you jump drop me off on the street in

624

00:23:29,430 --> 00:23:27,600

moscow i could probably survive but

625

00:23:30,870 --> 00:23:29,440

people probably laughing at me but they

626
00:23:32,870 --> 00:23:30,880
would understand what i was trying to

627
00:23:35,430 --> 00:23:32,880
say

628
00:23:37,590 --> 00:23:35,440
and clark creek stem academy we've got

629
00:23:38,549 --> 00:23:37,600
about time for one more question

630
00:23:41,590 --> 00:23:38,559
okay

631
00:23:47,750 --> 00:23:41,600
do you believe in extraterrestrials

632
00:23:51,750 --> 00:23:50,390
oh that's a loaded question

633
00:23:53,750 --> 00:23:51,760
i'm glad it's the last question now i'm

634
00:23:56,310 --> 00:23:53,760
just kidding um

635
00:23:57,830 --> 00:23:56,320
you know i i uh

636
00:23:59,430 --> 00:23:57,840
i've never first of all let me say that

637
00:24:00,870 --> 00:23:59,440
i've never seen an extraterrestrial i've

638
00:24:04,230 --> 00:24:00,880

never seen an alien or anything like

639

00:24:08,149 --> 00:24:04,240

that and i've never seen a ufo um but i

640

00:24:10,149 --> 00:24:08,159

do believe i do believe that we um

641

00:24:12,710 --> 00:24:10,159

that there are probably

642

00:24:15,110 --> 00:24:12,720

most likely other life forms out there

643

00:24:18,950 --> 00:24:15,120

it might not be something that we like

644

00:24:20,789 --> 00:24:18,960

understand visually as a life form

645

00:24:22,950 --> 00:24:20,799

so i um

646

00:24:25,029 --> 00:24:22,960

i don't think i believe in like

647

00:24:27,110 --> 00:24:25,039

extraterrestrials like an et the movie

648

00:24:29,830 --> 00:24:27,120

and stuff like that you know

649

00:24:33,029 --> 00:24:29,840

but i do i do uh find very very

650

00:24:35,190 --> 00:24:33,039

fascinating these you know earth-like

651
00:24:37,750 --> 00:24:35,200
planets that we're finding with with

652
00:24:40,070 --> 00:24:37,760
hubble and the other telescopes that you

653
00:24:43,669 --> 00:24:40,080
know given the right uh circumstances

654
00:24:46,070 --> 00:24:43,679
that we could find like organics in um

655
00:24:47,590 --> 00:24:46,080
in what we would refer to as soil or

656
00:24:49,909 --> 00:24:47,600
something like that that

657
00:24:51,669 --> 00:24:49,919
and maybe even a partial atmosphere

658
00:24:53,430 --> 00:24:51,679
where where

659
00:24:55,590 --> 00:24:53,440
organic life or

660
00:24:56,710 --> 00:24:55,600
self uh you know single cell kind of

661
00:24:58,230 --> 00:24:56,720
life or

662
00:25:00,630 --> 00:24:58,240
maybe even something a little more

663
00:25:02,149 --> 00:25:00,640

advanced could exist or plants or

664

00:25:03,190 --> 00:25:02,159

something like that so

665

00:25:05,029 --> 00:25:03,200

um

666

00:25:06,950 --> 00:25:05,039

you know i'm not a i'm not a planetary

667

00:25:08,310 --> 00:25:06,960

scientist and i'm not a you know a

668

00:25:10,710 --> 00:25:08,320

chemist but

669

00:25:12,390 --> 00:25:10,720

uh but i i have to believe that uh

670

00:25:14,230 --> 00:25:12,400

something like that probably is

671

00:25:16,710 --> 00:25:14,240

occurring somewhere somewhere in our in

672

00:25:18,870 --> 00:25:16,720

our uh in our universe so

673

00:25:21,190 --> 00:25:18,880

so uh but i don't think it looks like us

674

00:25:22,789 --> 00:25:21,200

i i personally don't think it uh that

675

00:25:24,710 --> 00:25:22,799

this life these life forms would look

676

00:25:27,990 --> 00:25:24,720

like us but

677

00:25:30,630 --> 00:25:28,000

okay okay thank you so much thank you

678

00:25:34,149 --> 00:25:32,470

welcome thank you guys great great

679

00:25:36,070 --> 00:25:34,159

questions and uh thanks for spending

680

00:25:37,669 --> 00:25:36,080

time with us uh today here at johnson