



1  
00:00:05,030 --> 00:00:03,429  
station this is houston are you ready

2  
00:00:10,870 --> 00:00:05,040  
for the event

3  
00:00:16,230 --> 00:00:13,350  
westwood one this is mission control

4  
00:00:18,790 --> 00:00:16,240  
houston please call station for a voice

5  
00:00:18,800 --> 00:00:23,750  
this is westwood one how do you hear me

6  
00:00:27,109 --> 00:00:25,830  
westwood one we have you loud and clear

7  
00:00:28,550 --> 00:00:27,119  
and we're ready for your questions

8  
00:00:30,710 --> 00:00:28,560  
welcome on board the international

9  
00:00:34,870 --> 00:00:30,720  
station this is westwood one how do you

10  
00:00:39,350 --> 00:00:36,790  
westwood one station has you loud and

11  
00:00:42,069 --> 00:00:39,360  
clear we're ready for your questions

12  
00:00:46,150 --> 00:00:44,069  
international space station commander

13  
00:00:48,310 --> 00:00:46,160

jeff williams and flight engineer kate

14

00:00:51,189 --> 00:00:48,320

rubins of nasa are aboard the

15

00:00:53,590 --> 00:00:51,199

international space station 250 miles

16

00:00:55,189 --> 00:00:53,600

above the earth and join us hello and

17

00:00:59,430 --> 00:00:55,199

what part of the globe are you flying

18

00:01:03,510 --> 00:01:01,670

well you caught me off guard here we've

19

00:01:05,830 --> 00:01:03,520

been of course we orbit the earth every

20

00:01:07,109 --> 00:01:05,840

90 minutes so we could be any side of

21

00:01:09,030 --> 00:01:07,119

the globe i haven't looked for a little

22

00:01:11,590 --> 00:01:09,040

while but in about 15 minutes we're

23

00:01:13,750 --> 00:01:11,600

going to be heading over uh africa so i

24

00:01:15,749 --> 00:01:13,760

suspect that we're in uh

25

00:01:18,149 --> 00:01:15,759

crossing the atlantic right now so right

26

00:01:20,870 --> 00:01:18,159

now you are over the atlantic in about

27

00:01:23,510 --> 00:01:20,880

every uh 90 minutes or so you circle the

28

00:01:27,910 --> 00:01:23,520

globe what five five uh

29

00:01:32,950 --> 00:01:30,789

well five miles per second 17 500 miles

30

00:01:34,870 --> 00:01:32,960

an hour 25 000 kilometers per hour

31

00:01:37,030 --> 00:01:34,880

whatever units you want to use pretty

32

00:01:39,270 --> 00:01:37,040

fast commander williams you've been in

33

00:01:40,710 --> 00:01:39,280

space numerous times on this occasion

34

00:01:43,350 --> 00:01:40,720

you're going to be outside the space

35

00:01:45,350 --> 00:01:43,360

station tell us about the spacewalk and

36

00:01:48,230 --> 00:01:45,360

what you and flight engineer rubens will

37

00:01:52,149 --> 00:01:49,590

well kate and i are going to go out here

38

00:01:55,270 --> 00:01:52,159

in a little over two weeks

39

00:01:57,350 --> 00:01:55,280

and the primary task is to install

40

00:01:59,510 --> 00:01:57,360

an international docking adapter which

41

00:02:02,069 --> 00:01:59,520

is uh something new it's a new addition

42

00:02:04,870 --> 00:02:02,079

to the space station to enable the

43

00:02:07,510 --> 00:02:04,880

docking of the upcoming now being

44

00:02:09,589 --> 00:02:07,520

developed commercial crew vehicles that

45

00:02:12,309 --> 00:02:09,599

will be used to rotate

46

00:02:14,790 --> 00:02:12,319

space station crews from u.s soil virgin

47

00:02:17,270 --> 00:02:14,800

galactic was just granted a license from

48

00:02:19,190 --> 00:02:17,280

the faa to bring tourists into space

49

00:02:21,430 --> 00:02:19,200

commander would this docking station

50

00:02:25,510 --> 00:02:21,440

allow us folks to come aboard and join

51  
00:02:28,309 --> 00:02:26,309  
well

52  
00:02:29,990 --> 00:02:28,319  
potentially whoever can get on one of

53  
00:02:31,190 --> 00:02:30,000  
those vehicles destined to the space

54  
00:02:33,110 --> 00:02:31,200  
station

55  
00:02:34,309 --> 00:02:33,120  
could come join us and i guess we'll

56  
00:02:37,030 --> 00:02:34,319  
just have to wait and see who those

57  
00:02:39,350 --> 00:02:37,040  
folks are flight engineer kate rubins

58  
00:02:41,910 --> 00:02:39,360  
how realistic or how many years away do

59  
00:02:43,990 --> 00:02:41,920  
you believe affordable space travel for

60  
00:02:48,229 --> 00:02:44,000  
the average citizen is going to be

61  
00:02:52,470 --> 00:02:49,910  
yeah i think if you look at the history

62  
00:02:55,509 --> 00:02:52,480  
of aviation it took us a long time

63  
00:02:57,990 --> 00:02:55,519

really to get to uh reliable commercial

64

00:02:59,589 --> 00:02:58,000

aviation and so it's actually extremely

65

00:03:01,589 --> 00:02:59,599

exciting i feel like we're in the middle

66

00:03:03,270 --> 00:03:01,599

of that process right now for space

67

00:03:05,270 --> 00:03:03,280

flight and we're seeing the development

68

00:03:06,949 --> 00:03:05,280

of a lot of new vehicles as jeff said

69

00:03:08,309 --> 00:03:06,959

we're going to start to launch from u.s

70

00:03:10,949 --> 00:03:08,319

soil soon

71

00:03:13,030 --> 00:03:10,959

so for us just to be on the ground floor

72

00:03:14,949 --> 00:03:13,040

and to be able to install something on

73

00:03:16,390 --> 00:03:14,959

the international space station that's

74

00:03:18,550 --> 00:03:16,400

going to help all these commercial

75

00:03:21,430 --> 00:03:18,560

vehicles is pretty exciting she has a

76  
00:03:24,149 --> 00:03:21,440  
degree in molecular biology and a phd in

77  
00:03:26,070 --> 00:03:24,159  
cancer biology from stanford university

78  
00:03:28,789 --> 00:03:26,080  
dr rubins you've done a lot of research

79  
00:03:30,710 --> 00:03:28,799  
on hiv and infectious disease and you

80  
00:03:33,270 --> 00:03:30,720  
you help the army develop an ebola

81  
00:03:34,869 --> 00:03:33,280  
therapy a big issue across the u.s and

82  
00:03:37,830 --> 00:03:34,879  
central and southern america right now

83  
00:03:39,750 --> 00:03:37,840  
concerns the zika virus i'm sure you are

84  
00:03:41,910 --> 00:03:39,760  
doing a lot of research in space on

85  
00:03:43,750 --> 00:03:41,920  
issues like osteoporosis for instance

86  
00:03:48,949 --> 00:03:43,760  
but let me ask you are you researching

87  
00:03:53,589 --> 00:03:51,110  
well that's a good question and

88  
00:03:56,149 --> 00:03:53,599

we actually have a specific level of

89

00:03:58,149 --> 00:03:56,159

biosafety that we allow on board because

90

00:04:00,550 --> 00:03:58,159

we're in this closed environment so we

91

00:04:02,149 --> 00:04:00,560

constantly recycle our air and our water

92

00:04:04,630 --> 00:04:02,159

so we couldn't have something

93

00:04:07,030 --> 00:04:04,640

that's a dangerous pathogen on board but

94

00:04:10,390 --> 00:04:07,040

what we can observe is what happens to

95

00:04:12,470 --> 00:04:10,400

common human pathogens and so we do know

96

00:04:14,949 --> 00:04:12,480

that just the viruses that you carry in

97

00:04:16,949 --> 00:04:14,959

your body reactivate and become a little

98

00:04:19,830 --> 00:04:16,959

bit more virulent on board that's going

99

00:04:21,909 --> 00:04:19,840

to help us learn a lot about basic virus

100

00:04:23,909 --> 00:04:21,919

immune system interaction and some

101

00:04:25,909 --> 00:04:23,919

fundamental understanding of what makes

102

00:04:28,150 --> 00:04:25,919

viruses tick and how humans can fight

103

00:04:30,390 --> 00:04:28,160

them better so in addition to your

104

00:04:32,790 --> 00:04:30,400

spacewalk and your duties as flight

105

00:04:37,830 --> 00:04:32,800

engineer are you personally conducting

106

00:04:41,749 --> 00:04:39,990

actually i don't even uh really feel the

107

00:04:44,310 --> 00:04:41,759

need to do that much personal research

108

00:04:46,310 --> 00:04:44,320

up here it's so much fun to just be able

109

00:04:48,390 --> 00:04:46,320

to participate in about a hundred

110

00:04:49,830 --> 00:04:48,400

different scientific experiments there's

111

00:04:51,830 --> 00:04:49,840

a few things that i want to pull out on

112

00:04:54,469 --> 00:04:51,840

the weekend just to see how fluids move

113

00:04:55,749 --> 00:04:54,479

around and do a couple videos to

114

00:04:58,070 --> 00:04:55,759

demonstrate some of the unique

115

00:05:00,150 --> 00:04:58,080

properties of microgravity back on earth

116

00:05:02,950 --> 00:05:00,160

right now i'm just having fun being the

117

00:05:04,710 --> 00:05:02,960

uh the technician for all of these folks

118

00:05:07,830 --> 00:05:04,720

research up here we've got like you said

119

00:05:09,990 --> 00:05:07,840

a variety of heart cell and osteoblast

120

00:05:12,310 --> 00:05:10,000

research and just too numerous to

121

00:05:14,469 --> 00:05:12,320

mention commander williams the astronaut

122

00:05:16,310 --> 00:05:14,479

who currently holds the american record

123

00:05:19,510 --> 00:05:16,320

for most time spent in space is

124

00:05:25,909 --> 00:05:19,520

astronaut scott kelly at 340 days but

125

00:05:31,590 --> 00:05:28,629

uh yeah i keep getting reminded of that

126

00:05:33,990 --> 00:05:31,600

um i'd like to to i mean it's

127

00:05:36,550 --> 00:05:34,000

it's been an honor to be uh to have

128

00:05:38,629 --> 00:05:36,560

throughout my career the the opportunity

129

00:05:41,029 --> 00:05:38,639

to watch the space station grow to work

130

00:05:42,629 --> 00:05:41,039

on it before the the first the launch of

131

00:05:44,150 --> 00:05:42,639

the first element and then to

132

00:05:45,749 --> 00:05:44,160

participate in the building of it in

133

00:05:47,909 --> 00:05:45,759

different phases and now to see it in

134

00:05:50,870 --> 00:05:47,919

full utilization mode so that's the

135

00:05:53,110 --> 00:05:50,880

really uh the the tribute is to the the

136

00:05:55,350 --> 00:05:53,120

international team and the partnership

137

00:05:56,309 --> 00:05:55,360

that made this magnificent orbital

138

00:05:57,670 --> 00:05:56,319

outpost

139

00:06:00,469 --> 00:05:57,680

in laboratory

140

00:06:03,110 --> 00:06:00,479

possible not bad for a guy who graduated

141

00:06:06,230 --> 00:06:03,120

first in his class in u.s navy test

142

00:06:08,950 --> 00:06:06,240

pilot school in 1993 how does test pilot

143

00:06:13,749 --> 00:06:08,960

school differ from the top gun program

144

00:06:17,990 --> 00:06:15,830

well the test pilot school military test

145

00:06:20,070 --> 00:06:18,000

pilot school trains you to evaluate

146

00:06:22,950 --> 00:06:20,080

aircraft based on their air worthiness

147

00:06:25,510 --> 00:06:22,960

and how the systems perform so rather

148

00:06:27,350 --> 00:06:25,520

than just flying operationally you know

149

00:06:29,189 --> 00:06:27,360

you're you're spending a lot of time

150

00:06:31,510 --> 00:06:29,199

you'll learn how to pay attention to the

151

00:06:33,350 --> 00:06:31,520

details and the flight characteristics

152

00:06:34,710 --> 00:06:33,360

to try to improve the handling qualities

153

00:06:36,950 --> 00:06:34,720

and the flying characteristics of

154

00:06:37,909 --> 00:06:36,960

aircraft so it's more of an engineering

155

00:06:41,909 --> 00:06:37,919

job

156

00:06:44,469 --> 00:06:41,919

experience to have to prepare you for

157

00:06:47,029 --> 00:06:44,479

what we do here because we're evaluating

158

00:06:49,510 --> 00:06:47,039

things and

159

00:06:51,670 --> 00:06:49,520

executing new procedures and using new

160

00:06:53,350 --> 00:06:51,680

equipment all the time up here certainly

161

00:06:55,110 --> 00:06:53,360

isis

162

00:06:57,029 --> 00:06:55,120

international space station commander

163

00:06:59,589 --> 00:06:57,039

jeff williams and flight engineer kate

164

00:07:05,189 --> 00:06:59,599

rubins of nasa how do we follow you each

165

00:07:09,510 --> 00:07:07,510

so i'm trying to do a few posts to the

166

00:07:11,350 --> 00:07:09,520

at nasa astronauts account and that's

167

00:07:13,589 --> 00:07:11,360

actually a great account you can follow

168

00:07:16,390 --> 00:07:13,599

all the nasa astronauts there and you

169

00:07:18,150 --> 00:07:16,400

can also look at iss research or

170

00:07:19,350 --> 00:07:18,160

international space station accounts and

171

00:07:21,990 --> 00:07:19,360

that will update you about all the

172

00:07:24,309 --> 00:07:22,000

experiments uh the exciting science some

173

00:07:26,710 --> 00:07:24,319

of the eva tests we have up here

174

00:07:31,510 --> 00:07:26,720

and we'll be watching you both uh during

175

00:07:32,870 --> 00:07:31,520

the spacewalk good luck to you both

176

00:07:39,670 --> 00:07:32,880

thank you very much it was great to have

177

00:07:44,309 --> 00:07:42,230

station this is houston acr that

178

00:07:46,390 --> 00:07:44,319

concludes the one one portion of the

179

00:07:54,869 --> 00:07:46,400

event please stand by for a voice check

180

00:08:00,950 --> 00:07:56,390

hello international space station this

181

00:08:04,070 --> 00:08:02,710

this is the international space station

182

00:08:05,749 --> 00:08:04,080

we have you loud and clear and we're

183

00:08:07,510 --> 00:08:05,759

ready for your questions

184

00:08:14,550 --> 00:08:07,520

uh good morning commander williams and

185

00:08:19,270 --> 00:08:16,710

great it is great to talk to you

186

00:08:19,990 --> 00:08:19,280

it's great to talk to you um i'm going

187

00:08:21,430 --> 00:08:20,000

to

188

00:08:27,350 --> 00:08:21,440

did i hear that you guys were moving

189

00:08:31,270 --> 00:08:28,790

yeah we're uh we're actually going to be

190

00:08:32,790 --> 00:08:31,280

flying over africa pretty shortly uh we

191

00:08:34,550 --> 00:08:32,800

we just went and checked the the

192

00:08:35,589 --> 00:08:34,560

position on the globe

193

00:08:37,190 --> 00:08:35,599

okay

194

00:08:38,630 --> 00:08:37,200

i i want to begin with some scientific

195

00:08:41,190 --> 00:08:38,640

research questions and then move on to

196

00:08:42,949 --> 00:08:41,200

your upcoming space walk

197

00:08:44,310 --> 00:08:42,959

dr rubens you spent some time this week

198

00:08:48,550 --> 00:08:44,320

doing heart research what were you

199

00:08:51,750 --> 00:08:49,829

yeah so this is actually a great

200

00:08:52,949 --> 00:08:51,760

capability for the space station we're

201  
00:08:55,150 --> 00:08:52,959  
checking out

202  
00:08:58,070 --> 00:08:55,160  
the ability to grow heart cells

203  
00:08:59,990 --> 00:08:58,080  
cardiomyocytes in uh in the scientific

204  
00:09:01,509 --> 00:09:00,000  
terminology and we're going to see we're

205  
00:09:03,110 --> 00:09:01,519  
seeing if we can actually grow those in

206  
00:09:05,509 --> 00:09:03,120  
space one of the reasons that we're

207  
00:09:07,430 --> 00:09:05,519  
doing that is while we're in space we

208  
00:09:09,750 --> 00:09:07,440  
actually have an upward shift of our

209  
00:09:12,790 --> 00:09:09,760  
fluid without gravity it doesn't drain

210  
00:09:14,710 --> 00:09:12,800  
your fluid down into your legs and so

211  
00:09:17,030 --> 00:09:14,720  
this puts some unique stresses on your

212  
00:09:18,630 --> 00:09:17,040  
heart and the cardiovascular system and

213  
00:09:20,790 --> 00:09:18,640

we're hoping that by culturing some of

214

00:09:22,710 --> 00:09:20,800

these cardiomyocytes on board we can

215

00:09:25,750 --> 00:09:22,720

actually learn more about how heart

216

00:09:28,070 --> 00:09:25,760

cells organize how they beat an orbit

217

00:09:29,829 --> 00:09:28,080

and their their function and uh their

218

00:09:31,910 --> 00:09:29,839

molecular readout these cells are going

219

00:09:33,590 --> 00:09:31,920

to be sent back down to the ground on

220

00:09:35,030 --> 00:09:33,600

the spacex nine vehicle and the

221

00:09:36,470 --> 00:09:35,040

scientists on the ground can analyze

222

00:09:39,350 --> 00:09:36,480

them okay

223

00:09:40,790 --> 00:09:39,360

um are you

224

00:09:42,230 --> 00:09:40,800

looking at your own heart while you're

225

00:09:45,910 --> 00:09:42,240

in space i know you guys do a lot on

226

00:09:49,750 --> 00:09:48,070

yeah we sure are and this is one of the

227

00:09:50,470 --> 00:09:49,760

fascinating things about the space

228

00:09:53,269 --> 00:09:50,480

station

229

00:09:55,509 --> 00:09:53,279

is that it drives this kind of research

230

00:09:57,190 --> 00:09:55,519

in a remote environment so we actually

231

00:09:59,030 --> 00:09:57,200

have a team of folks on the ground

232

00:10:01,110 --> 00:09:59,040

who've developed some really fantastic

233

00:10:03,030 --> 00:10:01,120

techniques for guiding us using

234

00:10:04,949 --> 00:10:03,040

ultrasound on board so we're not

235

00:10:07,190 --> 00:10:04,959

ultrasound specialists we learn a little

236

00:10:09,350 --> 00:10:07,200

bit in training but we can actually use

237

00:10:11,829 --> 00:10:09,360

a remote guider and ultrasound our own

238

00:10:14,150 --> 00:10:11,839

hearts we can look at the valves we can

239

00:10:15,829 --> 00:10:14,160

look at the stroke volume a whole bunch

240

00:10:18,870 --> 00:10:15,839

of different things from the ground and

241

00:10:21,430 --> 00:10:18,880

this actually has a lot of use for the

242

00:10:23,110 --> 00:10:21,440

developing world for remote medicine

243

00:10:25,350 --> 00:10:23,120

anytime you can't get the patient and

244

00:10:27,670 --> 00:10:25,360

the doctor together in the same room you

245

00:10:29,430 --> 00:10:27,680

can use things like ultrasound and

246

00:10:31,190 --> 00:10:29,440

satellite networks to communicate

247

00:10:32,710 --> 00:10:31,200

medical information

248

00:10:36,870 --> 00:10:32,720

were you looking at the heart cells

249

00:10:40,949 --> 00:10:38,710

yes i sure was that actually was a great

250

00:10:42,949 --> 00:10:40,959

day on board space station to put out a

251  
00:10:45,030 --> 00:10:42,959  
very nice microscope and get it out and

252  
00:10:46,550 --> 00:10:45,040  
look through the lens for the first time

253  
00:10:48,069 --> 00:10:46,560  
okay i was wondering whether the

254  
00:10:49,350 --> 00:10:48,079  
experience of

255  
00:10:51,670 --> 00:10:49,360  
looking through a microscope in

256  
00:10:55,430 --> 00:10:51,680  
microgravity is different than it is on

257  
00:10:58,870 --> 00:10:56,710  
you know i think folks were thinking

258  
00:11:00,790 --> 00:10:58,880  
about that a little bit because we had

259  
00:11:02,310 --> 00:11:00,800  
some discussions about how best to tack

260  
00:11:04,630 --> 00:11:02,320  
it down and if it was going to move

261  
00:11:07,910 --> 00:11:04,640  
around a lot and actually as soon as i

262  
00:11:10,389 --> 00:11:07,920  
put my eyes on the eyepieces i felt like

263  
00:11:12,710 --> 00:11:10,399

i was in a lab back on earth doing my

264

00:11:13,990 --> 00:11:12,720

standard cell culture techniques so

265

00:11:16,069 --> 00:11:14,000

the microscope actually works

266

00:11:18,310 --> 00:11:16,079

phenomenally well on board

267

00:11:21,190 --> 00:11:18,320

it looks just like the cell culture that

268

00:11:22,870 --> 00:11:21,200

we see on the ground but we can observe

269

00:11:25,030 --> 00:11:22,880

all these interesting phenomena that

270

00:11:26,310 --> 00:11:25,040

happen in microgravity

271

00:11:28,069 --> 00:11:26,320

okay

272

00:11:30,389 --> 00:11:28,079

i've read that you were going to become

273

00:11:32,389 --> 00:11:30,399

the first astronaut to do dna sequencing

274

00:11:37,430 --> 00:11:32,399

in space that space station is that

275

00:11:41,190 --> 00:11:39,509

so we haven't done that yet and uh you

276

00:11:42,550 --> 00:11:41,200

know i think there's a lot of talk about

277

00:11:44,630 --> 00:11:42,560

me being the first astronaut to do it

278

00:11:46,310 --> 00:11:44,640

but really it's the first ground team to

279

00:11:48,710 --> 00:11:46,320

do it these are the guys that have done

280

00:11:51,590 --> 00:11:48,720

all the hard work there's a lot of folks

281

00:11:52,790 --> 00:11:51,600

at jsc at nasa ames

282

00:11:55,110 --> 00:11:52,800

at one of the companies that we're

283

00:11:57,269 --> 00:11:55,120

working with that have put together

284

00:12:00,069 --> 00:11:57,279

all of the technology development to do

285

00:12:02,150 --> 00:12:00,079

this sequencer on board and so it's a

286

00:12:03,910 --> 00:12:02,160

tech demo it's a proof of principle

287

00:12:06,150 --> 00:12:03,920

we're going to find out if this works in

288

00:12:09,350 --> 00:12:06,160

space we're going to try to understand

289

00:12:11,990 --> 00:12:09,360

how we can do dna sequencing and

290

00:12:14,389 --> 00:12:12,000

systems biology modern molecular biology

291

00:12:15,269 --> 00:12:14,399

while we're orbiting the earth

292

00:12:16,069 --> 00:12:15,279

okay

293

00:12:17,590 --> 00:12:16,079

uh

294

00:12:19,670 --> 00:12:17,600

is that an illumina thing it seems like

295

00:12:23,829 --> 00:12:19,680

everything that comes to dna sequencing

296

00:12:27,350 --> 00:12:25,910

yeah so um the technology that's been

297

00:12:29,910 --> 00:12:27,360

developed for the space station is

298

00:12:33,350 --> 00:12:29,920

actually an oxford nanopore it needs to

299

00:12:34,790 --> 00:12:33,360

be small and portable and remote and uh

300

00:12:36,790 --> 00:12:34,800

there's a lot of folks out there i think

301  
00:12:38,949 --> 00:12:36,800  
that are looking at a whole suite of

302  
00:12:40,870 --> 00:12:38,959  
different technologies anything that's a

303  
00:12:43,030 --> 00:12:40,880  
microfluidics chip would probably work

304  
00:12:44,790 --> 00:12:43,040  
really well up here okay

305  
00:12:46,550 --> 00:12:44,800  
uh you've had a great deal of

306  
00:12:52,069 --> 00:12:46,560  
experience studying viruses have you

307  
00:12:56,069 --> 00:12:53,910  
so we actually have a great amount of

308  
00:12:57,190 --> 00:12:56,079  
microbiology research up here which

309  
00:12:59,030 --> 00:12:57,200  
includes

310  
00:13:02,550 --> 00:12:59,040  
viruses and

311  
00:13:05,030 --> 00:13:02,560  
all bacterial organisms yeast fungi

312  
00:13:07,030 --> 00:13:05,040  
we have some individual experiments that

313  
00:13:09,190 --> 00:13:07,040

will look in canisters

314

00:13:11,030 --> 00:13:09,200

that the astronauts can activate and

315

00:13:11,990 --> 00:13:11,040

look at various processes that are going

316

00:13:14,710 --> 00:13:12,000

on

317

00:13:16,550 --> 00:13:14,720

in in microbiological organisms but

318

00:13:19,069 --> 00:13:16,560

we're also studying the station as a

319

00:13:21,190 --> 00:13:19,079

whole so we're trying to understand the

320

00:13:24,389 --> 00:13:21,200

microbiological environment on space

321

00:13:26,870 --> 00:13:24,399

station bacteria viruses we normally

322

00:13:28,470 --> 00:13:26,880

carry bacteria with us all the time and

323

00:13:30,150 --> 00:13:28,480

we would expect that there's a lot of

324

00:13:31,990 --> 00:13:30,160

bacteria up here it's not a sterile

325

00:13:34,550 --> 00:13:32,000

environment it's a very nice and clean

326

00:13:36,310 --> 00:13:34,560

environment jeff and i try to keep it in

327

00:13:39,670 --> 00:13:36,320

ship shape along with our crewmate

328

00:13:41,590 --> 00:13:39,680

takuyo nishi and our russian cosmonauts

329

00:13:43,990 --> 00:13:41,600

but there is some interesting places to

330

00:13:45,750 --> 00:13:44,000

take a look at the microbiome of the

331

00:13:47,750 --> 00:13:45,760

space station so that's all part of the

332

00:13:49,990 --> 00:13:47,760

research that folks have developed and

333

00:13:52,870 --> 00:13:50,000

we're really looking at that plan as a

334

00:13:56,069 --> 00:13:52,880

whole to understand microbiology in

335

00:13:57,350 --> 00:13:56,079

microgravity okay um a reader wanted to

336

00:13:59,430 --> 00:13:57,360

know whether

337

00:14:00,870 --> 00:13:59,440

your sleep has been disrupted by being

338

00:14:03,030 --> 00:14:00,880

in space some astronauts have had

339

00:14:07,509 --> 00:14:03,040

trouble periodically with sleep how are

340

00:14:12,550 --> 00:14:10,150

so sleep is great up here it's actually

341

00:14:15,269 --> 00:14:12,560

a really nice resting state

342

00:14:18,069 --> 00:14:15,279

after you exercise it takes less time

343

00:14:20,710 --> 00:14:18,079

for your muscles to recover and

344

00:14:22,949 --> 00:14:20,720

so we look a little bit like

345

00:14:27,110 --> 00:14:22,959

zombies when we're sleeping

346

00:14:33,829 --> 00:14:28,790

are you tethered to a wall in a

347

00:14:37,910 --> 00:14:36,150

yeah we have a really small little crew

348

00:14:40,230 --> 00:14:37,920

quarters that we can use and and it's

349

00:14:42,230 --> 00:14:40,240

just a perfect amount of space we've got

350

00:14:44,470 --> 00:14:42,240

a sleeping bag on the wall and you can

351

00:14:46,870 --> 00:14:44,480

climb into your sleeping bag and go

352

00:14:48,470 --> 00:14:46,880

right to sleep here okay uh this

353

00:14:49,750 --> 00:14:48,480

question is for for the both of you you

354

00:14:52,870 --> 00:14:49,760

and commander williams are scheduled to

355

00:14:54,230 --> 00:14:52,880

do a joint space walk on august uh 19th

356

00:14:57,670 --> 00:14:54,240

in late terms what is the purpose of

357

00:15:00,949 --> 00:14:59,189

well we have a couple of tasks on the

358

00:15:03,269 --> 00:15:00,959

spacewalk but the primary one is to

359

00:15:05,350 --> 00:15:03,279

install the first international docking

360

00:15:06,710 --> 00:15:05,360

adapter on the very front end of the

361

00:15:07,670 --> 00:15:06,720

space station

362

00:15:10,230 --> 00:15:07,680

to

363

00:15:12,389 --> 00:15:10,240

enable an interface a docking interface

364

00:15:13,990 --> 00:15:12,399

for the future commercial

365

00:15:16,150 --> 00:15:14,000

crewed vehicles

366

00:15:19,350 --> 00:15:16,160

currently being developed

367

00:15:21,670 --> 00:15:19,360

by spacex and boeing those two companies

368

00:15:23,350 --> 00:15:21,680

and and hopefully flying here within the

369

00:15:25,509 --> 00:15:23,360

next couple three years

370

00:15:27,509 --> 00:15:25,519

to deliver crews to the international

371

00:15:29,350 --> 00:15:27,519

space station from u.s soil

372

00:15:31,030 --> 00:15:29,360

okay commander williams you have a great

373

00:15:32,629 --> 00:15:31,040

deal of experience doing space walks

374

00:15:34,470 --> 00:15:32,639

what kind of advice have you been

375

00:15:38,629 --> 00:15:34,480

passing on to dr rubin's for what will

376

00:15:42,230 --> 00:15:40,629

well i'm very confident in kate she's

377

00:15:44,310 --> 00:15:42,240

going to do very well out there but we

378

00:15:46,310 --> 00:15:44,320

we are talking about the

379

00:15:48,870 --> 00:15:46,320

uh the actual conditions of going

380

00:15:51,269 --> 00:15:48,880

outside and doing a space walk moving

381

00:15:53,670 --> 00:15:51,279

large masses to include yourself because

382

00:15:55,509 --> 00:15:53,680

the suit is several hundred pounds added

383

00:15:57,670 --> 00:15:55,519

to your body weight that's a a lot of

384

00:15:59,749 --> 00:15:57,680

mass to manage the techniques for the

385

00:16:01,110 --> 00:15:59,759

workspace will be rehearsing it's just

386

00:16:02,870 --> 00:16:01,120

like anything that's it's highly

387

00:16:05,189 --> 00:16:02,880

choreographed we're going to be

388

00:16:07,749 --> 00:16:05,199

rehearsing the details over and over

389

00:16:09,910 --> 00:16:07,759

again up to the the day of the spacewalk

390

00:16:11,590 --> 00:16:09,920

okay alaska a couple of questions uh

391

00:16:13,189 --> 00:16:11,600

will the confines of your helmet make it

392

00:16:17,590 --> 00:16:13,199

difficult to see beyond what you're

393

00:16:21,509 --> 00:16:19,590

well depends upon where you're facing uh

394

00:16:24,069 --> 00:16:21,519

if you're if your head is full of space

395

00:16:26,870 --> 00:16:24,079

station and you're buried in a work site

396

00:16:28,389 --> 00:16:26,880

then you don't see much other than that

397

00:16:29,829 --> 00:16:28,399

but oftentimes when you're translating

398

00:16:31,350 --> 00:16:29,839

around the outside of the space station

399

00:16:33,670 --> 00:16:31,360

or you get a free moment you can turn

400

00:16:35,670 --> 00:16:33,680

around and look out into deep space or

401  
00:16:37,350 --> 00:16:35,680  
look at the entire globe of the earth

402  
00:16:38,389 --> 00:16:37,360  
and those are some really memorable

403  
00:16:40,550 --> 00:16:38,399  
moments

404  
00:16:43,269 --> 00:16:40,560  
that i'm sure both of us will have in

405  
00:16:44,790 --> 00:16:43,279  
this upcoming spacewalk okay dr rubens

406  
00:16:48,150 --> 00:16:44,800  
you have a lot of experience as a scuba

407  
00:16:50,790 --> 00:16:48,160  
diver um how different is the sensation

408  
00:16:54,629 --> 00:16:50,800  
of moving in microgravity from moving in

409  
00:16:57,749 --> 00:16:56,389  
that's a great question and actually one

410  
00:17:00,069 --> 00:16:57,759  
of the things that i've been thinking

411  
00:17:03,030 --> 00:17:00,079  
about a lot ever since i've been up here

412  
00:17:04,630 --> 00:17:03,040  
is how similar the space station is to

413  
00:17:07,669 --> 00:17:04,640

our training in the neutral buoyancy

414

00:17:09,829 --> 00:17:07,679

laboratory at nasa so we have uh what's

415

00:17:12,150 --> 00:17:09,839

essentially a very large swimming pool

416

00:17:14,309 --> 00:17:12,160

with a lot of the parts of space station

417

00:17:17,110 --> 00:17:14,319

structure underwater and we spend

418

00:17:19,829 --> 00:17:17,120

hundreds of hours training underwater in

419

00:17:22,390 --> 00:17:19,839

the space suit and so even things inside

420

00:17:23,510 --> 00:17:22,400

the cabin like jeff said moving large

421

00:17:25,189 --> 00:17:23,520

masses

422

00:17:26,390 --> 00:17:25,199

anytime you're trying to work with an

423

00:17:28,390 --> 00:17:26,400

object

424

00:17:30,549 --> 00:17:28,400

you really see physics play out every

425

00:17:32,630 --> 00:17:30,559

day here and so a lot of those lessons

426

00:17:35,350 --> 00:17:32,640

that we learned in our training

427

00:17:37,990 --> 00:17:35,360

really apply inside the inside the space

428

00:17:39,669 --> 00:17:38,000

station as well i think uh on spacewalks

429

00:17:41,270 --> 00:17:39,679

so there's a lot of similarities to

430

00:17:43,190 --> 00:17:41,280

scuba diving there's even more

431

00:17:45,750 --> 00:17:43,200

similarities to our neutral buoyancy

432

00:17:48,230 --> 00:17:45,760

laboratory training okay when you and i

433

00:17:50,070 --> 00:17:48,240

spoke last october uh you said you would

434

00:17:51,830 --> 00:17:50,080

be able to see la jolla from space

435

00:17:56,150 --> 00:17:51,840

station and that you hope to photograph

436

00:18:01,110 --> 00:17:58,390

yeah so we got a great california

437

00:18:03,510 --> 00:18:01,120

pass when i first arrived here and

438

00:18:06,070 --> 00:18:03,520

jeff showed me all up and down

439

00:18:08,310 --> 00:18:06,080

all the way from the southern california

440

00:18:09,430 --> 00:18:08,320

border with mexico we could see up

441

00:18:12,390 --> 00:18:09,440

through

442

00:18:13,750 --> 00:18:12,400

oregon and into washington and so i got

443

00:18:15,830 --> 00:18:13,760

a great series of photographs of

444

00:18:17,909 --> 00:18:15,840

california but i've been looking on the

445

00:18:20,070 --> 00:18:17,919

map and trying to see when we're exactly

446

00:18:23,029 --> 00:18:20,080

over la jolla that might be quite a few

447

00:18:24,549 --> 00:18:23,039

months yet until we get a good pass but

448

00:18:26,870 --> 00:18:24,559

i will make sure that i get some good

449

00:18:28,230 --> 00:18:26,880

photos for you okay what is the most

450

00:18:29,990 --> 00:18:28,240

interesting thing that you've seen

451  
00:18:35,590 --> 00:18:30,000  
through a lens of a camera up there what

452  
00:18:39,270 --> 00:18:37,830  
that is a really hard question i think

453  
00:18:40,630 --> 00:18:39,280  
basically every time you look through

454  
00:18:43,510 --> 00:18:40,640  
the lens of the camera there is

455  
00:18:45,830 --> 00:18:43,520  
something completely fascinating uh it

456  
00:18:46,710 --> 00:18:45,840  
just takes your breath away every time

457  
00:18:48,950 --> 00:18:46,720  
okay

458  
00:18:51,750 --> 00:18:48,960  
i want to close by noting that uh your

459  
00:18:54,150 --> 00:18:51,760  
alma mater uh uc san diego will have

460  
00:18:55,909 --> 00:18:54,160  
about six thousand freshmen this fall

461  
00:18:57,750 --> 00:18:55,919  
do you have a message for young people

462  
00:19:02,789 --> 00:18:57,760  
like this about trying to find what it

463  
00:19:07,830 --> 00:19:05,590

yeah i think actually um young folks

464

00:19:10,150 --> 00:19:07,840

usually have a good sense of what they

465

00:19:11,909 --> 00:19:10,160

want to do if you really ask them what

466

00:19:14,150 --> 00:19:11,919

drives you what's your passion what's

467

00:19:15,990 --> 00:19:14,160

your motivation that's usually in there

468

00:19:18,310 --> 00:19:16,000

somewhere and i think my message is to

469

00:19:20,470 --> 00:19:18,320

pay attention to that that that folks

470

00:19:22,390 --> 00:19:20,480

should find what really inspires them

471

00:19:25,590 --> 00:19:22,400

that they should always pursue what they

472

00:19:27,909 --> 00:19:25,600

want to do and if you're working hard

473

00:19:29,590 --> 00:19:27,919

and you're motivated about something

474

00:19:32,470 --> 00:19:29,600

young people can accomplish a lot i

475

00:19:34,230 --> 00:19:32,480

think the students at uc san diego have

476

00:19:35,909 --> 00:19:34,240

their whole future in front of them and

477

00:19:38,470 --> 00:19:35,919

i'm excited for them to get started in

478

00:19:40,070 --> 00:19:38,480

their freshman year good it's such a joy

479

00:19:41,830 --> 00:19:40,080

to talk to you i really appreciate it

480

00:19:45,510 --> 00:19:41,840

and good luck to both of you on your

481

00:19:48,549 --> 00:19:47,029

thank you very much it was great talking

482

00:19:50,830 --> 00:19:48,559

to you today as well

483

00:20:01,510 --> 00:19:54,470

you station this is houston acr thank

484

00:20:06,549 --> 00:20:03,909

thank you westwood 1 and the san diego