
OVHD
EXIT

1
00:00:09,509 --> 00:00:02,310
station this is houston are you ready

2
00:00:13,110 --> 00:00:11,669
houston station and uh i'm ready for the

3
00:00:15,190 --> 00:00:13,120
event

4
00:00:17,029 --> 00:00:15,200
united states coast guard academy this

5
00:00:19,189 --> 00:00:17,039
is mission control houston please call

6
00:00:21,269 --> 00:00:19,199
station for a voice check

7
00:00:36,150 --> 00:00:21,279
station this is united states coast

8
00:00:36,160 --> 00:00:45,590
um

9
00:00:55,270 --> 00:00:46,790
okay

10
00:00:58,470 --> 00:00:56,869
coast guard academy international space

11
00:00:59,990 --> 00:00:58,480
station i've got you loud and clear dr

12
00:01:02,069 --> 00:01:00,000
addressing

13
00:01:03,990 --> 00:01:02,079

dan great to hear your voice

14
00:01:06,070 --> 00:01:04,000
for our schools this is professor ron

15
00:01:07,670 --> 00:01:06,080
anderson of the coast guard academy

16
00:01:09,350 --> 00:01:07,680
broadcasting from the richard friedman

17
00:01:11,510 --> 00:01:09,360
studios from our beautiful waterfront

18
00:01:14,070 --> 00:01:11,520
campus in new london connecticut it is

19
00:01:16,870 --> 00:01:14,080
my honor and privilege to introduce to

20
00:01:19,429 --> 00:01:16,880
you a 1985 graduate of the coast guard

21
00:01:22,070 --> 00:01:19,439
academy a retired coast guard pilot

22
00:01:24,310 --> 00:01:22,080
academy engineering professor and nassar

23
00:01:29,510 --> 00:01:24,320
astronaut captain daniel burbank dan

24
00:01:33,350 --> 00:01:31,510
well first off i'd like to uh to

25
00:01:34,710 --> 00:01:33,360
congratulate you on doing the mentoring

26
00:01:37,190 --> 00:01:34,720
program that you're doing i think it's

27
00:01:38,950 --> 00:01:37,200
fantastic that institutions like the

28
00:01:40,149 --> 00:01:38,960
coast guard academy

29
00:01:43,590 --> 00:01:40,159
take it

30
00:01:46,550 --> 00:01:43,600
as a as a task for them to to start to

31
00:01:48,230 --> 00:01:46,560
mentor and reach out to kids in schools

32
00:01:50,789 --> 00:01:48,240
all around the country and get them

33
00:01:53,030 --> 00:01:50,799
inspired to pursue careers in science

34
00:01:54,469 --> 00:01:53,040
technology engineering and math

35
00:01:55,749 --> 00:01:54,479
we need those kinds of skills in the

36
00:01:57,350 --> 00:01:55,759
coast guard we need those kinds of

37
00:01:59,190 --> 00:01:57,360
skills and all the services we need

38
00:02:00,789 --> 00:01:59,200

those kinds of skills throughout

39
00:02:01,670 --> 00:02:00,799
skills throughout industry in the united

40
00:02:03,350 --> 00:02:01,680
states

41
00:02:04,709 --> 00:02:03,360
and i can tell you firsthand we

42
00:02:06,230 --> 00:02:04,719
certainly need those kinds of skills

43
00:02:09,350 --> 00:02:06,240
here in the space program and onboard

44
00:02:11,589 --> 00:02:09,360
the international space station

45
00:02:13,430 --> 00:02:11,599
thank you dan for this event hundreds of

46
00:02:15,270 --> 00:02:13,440
school kids in four different cities

47
00:02:17,350 --> 00:02:15,280
competed for the honor to ask captain

48
00:02:19,350 --> 00:02:17,360
dan burbank a question he will be

49
00:02:21,750 --> 00:02:19,360
answering questions from students up and

50
00:02:24,229 --> 00:02:21,760
down the east coast and now to the

51
00:02:26,070 --> 00:02:24,239
questions our first will be from a new

52
00:02:28,790 --> 00:02:26,080
school that after only four years is

53
00:02:32,470 --> 00:02:28,800
making a huge educational difference in

54
00:02:36,790 --> 00:02:34,869
captain burbank to you and the other

55
00:02:38,869 --> 00:02:36,800
five astronauts on the international

56
00:02:40,470 --> 00:02:38,879
space station a huge hello from

57
00:02:41,830 --> 00:02:40,480
friendship academy of engineering and

58
00:02:43,589 --> 00:02:41,840
technology

59
00:02:46,150 --> 00:02:43,599
in baltimore maryland

60
00:02:48,229 --> 00:02:46,160
captain as a general overview what types

61
00:02:53,910 --> 00:02:48,239
of experiments do you do on the space

62
00:02:57,910 --> 00:02:55,670
in general the categories of experiments

63
00:03:00,070 --> 00:02:57,920

we do on space station range from basic

64
00:03:02,470 --> 00:03:00,080
science physical sciences combustion

65
00:03:05,190 --> 00:03:02,480
research fluid

66
00:03:07,589 --> 00:03:05,200
physics research for example to apply

67
00:03:09,190 --> 00:03:07,599
technology investigation so we've got

68
00:03:12,470 --> 00:03:09,200
some things that not necessarily

69
00:03:14,790 --> 00:03:12,480
categorized as scientific investigations

70
00:03:17,030 --> 00:03:14,800
but have to do with how to keep a

71
00:03:18,630 --> 00:03:17,040
functioning space station operating and

72
00:03:21,350 --> 00:03:18,640
in low-earth orbit how to keep crews

73
00:03:23,270 --> 00:03:21,360
healthy so we we're working to close the

74
00:03:25,430 --> 00:03:23,280
environmental control support system

75
00:03:27,750 --> 00:03:25,440
loop for example to allow us to leave

76
00:03:29,190 --> 00:03:27,760
low earth orbit and go to up to places

77
00:03:31,190 --> 00:03:29,200
in deep space

78
00:03:33,589 --> 00:03:31,200
we also do a lot of biological

79
00:03:35,509 --> 00:03:33,599
experiments to support that same kind of

80
00:03:36,869 --> 00:03:35,519
pursuit so

81
00:03:38,710 --> 00:03:36,879
onboard space station a lot of the

82
00:03:40,390 --> 00:03:38,720
research we're doing and in our case for

83
00:03:41,670 --> 00:03:40,400
the six months we're here it's well over

84
00:03:42,869 --> 00:03:41,680
100 experiments that we're going to be

85
00:03:44,869 --> 00:03:42,879
conducting

86
00:03:46,470 --> 00:03:44,879
a lot of that research is

87
00:03:47,990 --> 00:03:46,480
we're operating as subjects we're

88
00:03:50,149 --> 00:03:48,000

operating as investigators or

89
00:03:51,910 --> 00:03:50,159
co-investigators with researchers on the

90
00:03:54,070 --> 00:03:51,920
ground and

91
00:03:56,229 --> 00:03:54,080
we are we're learning as much as we can

92
00:03:57,670 --> 00:03:56,239
about how to keep humans healthy and

93
00:03:59,509 --> 00:03:57,680
safe and how to

94
00:04:01,270 --> 00:03:59,519
basically offset the adverse effects of

95
00:04:02,949 --> 00:04:01,280
being a microgravity and some of those

96
00:04:05,270 --> 00:04:02,959
things have a lot of applicability to

97
00:04:07,750 --> 00:04:05,280
life on earth as well for folks

98
00:04:10,470 --> 00:04:07,760
that are uh that are bedridden for folks

99
00:04:11,830 --> 00:04:10,480
that are that are aged and these kinds

100
00:04:14,630 --> 00:04:11,840
of things that you learn right here also

101
00:04:16,550 --> 00:04:14,640
have applicability there

102
00:04:20,629 --> 00:04:16,560
our next question is from an amazing

103
00:04:22,629 --> 00:04:20,639
all-girls school in atlanta georgia

104
00:04:24,390 --> 00:04:22,639
hello to the crew of the iss from the

105
00:04:26,710 --> 00:04:24,400
coretta scott king young women's

106
00:04:29,350 --> 00:04:26,720
leadership academy in atlanta georgia

107
00:04:31,990 --> 00:04:29,360
captain what recent nasa resources

108
00:04:39,350 --> 00:04:32,000
researches or inventions might help with

109
00:04:42,550 --> 00:04:41,030
okay that's these are these are great

110
00:04:44,310 --> 00:04:42,560
questions and that's a particularly good

111
00:04:46,310 --> 00:04:44,320
one and it's very timely in this day and

112
00:04:47,590 --> 00:04:46,320
age uh some of the research we're doing

113
00:04:49,749 --> 00:04:47,600

including in some of the research in the

114
00:04:51,670 --> 00:04:49,759
racks that are off to the left side of

115
00:04:53,350 --> 00:04:51,680
your field of view right now

116
00:04:56,230 --> 00:04:53,360
actually answer some questions about

117
00:04:58,390 --> 00:04:56,240
fundamental processes and combustion

118
00:04:59,909 --> 00:04:58,400
when we're here in low earth orbit

119
00:05:02,390 --> 00:04:59,919
orbiting in the space station we can

120
00:05:04,469 --> 00:05:02,400
essentially isolate the gravitational

121
00:05:05,830 --> 00:05:04,479
effects that that influence or produce

122
00:05:08,790 --> 00:05:05,840
convection

123
00:05:10,950 --> 00:05:08,800
that that cloud

124
00:05:12,629 --> 00:05:10,960
a lot of the science of combustion

125
00:05:14,230 --> 00:05:12,639
research on planet earth and we can do

126
00:05:16,469 --> 00:05:14,240
it on fairly large scale here we can

127
00:05:18,230 --> 00:05:16,479
suspend droplets of fuel completely

128
00:05:20,310 --> 00:05:18,240
independent of the gravitational effects

129
00:05:22,550 --> 00:05:20,320
independent of any structure around them

130
00:05:25,270 --> 00:05:22,560
and very precisely

131
00:05:27,430 --> 00:05:25,280
study how the combustion process unfolds

132
00:05:29,350 --> 00:05:27,440
and it's helping us on the one hand

133
00:05:31,110 --> 00:05:29,360
design better fuel systems better fire

134
00:05:32,710 --> 00:05:31,120
suppressant systems for spacecraft but

135
00:05:34,629 --> 00:05:32,720
it's also helping us to understand at a

136
00:05:37,909 --> 00:05:34,639
very fundamental level how to make the

137
00:05:39,830 --> 00:05:37,919
combustion process uh cleaner so that we

138
00:05:42,230 --> 00:05:39,840

can produce few we can we can

139
00:05:43,990 --> 00:05:42,240
essentially combust fuels on planet

140
00:05:46,230 --> 00:05:44,000
earth and do so without polluting the

141
00:05:48,550 --> 00:05:46,240
environment and perhaps do so more

142
00:05:50,230 --> 00:05:48,560
efficiently than we could otherwise do

143
00:05:52,469 --> 00:05:50,240
another thing we we're doing up here

144
00:05:56,070 --> 00:05:52,479
which i think also would help a lot with

145
00:05:58,150 --> 00:05:56,080
usage of earth's resource sources is

146
00:06:00,070 --> 00:05:58,160
the closed cycle the closed loop life

147
00:06:01,909 --> 00:06:00,080
support experiments that i alluded to on

148
00:06:04,070 --> 00:06:01,919
the first question and essentially what

149
00:06:08,309 --> 00:06:04,080
we're trying to do is remove the

150
00:06:10,070 --> 00:06:08,319
dependency on resupplies to bring us you

151
00:06:12,390 --> 00:06:10,080
know vehicles like the space shuttle for

152
00:06:14,150 --> 00:06:12,400
example to bring us water for example if

153
00:06:16,870 --> 00:06:14,160
we can reclaim as much of the water that

154
00:06:18,550 --> 00:06:16,880
we exhale as water vapor the water that

155
00:06:20,390 --> 00:06:18,560
we that we

156
00:06:22,390 --> 00:06:20,400
through normal processes uh through

157
00:06:24,150 --> 00:06:22,400
urination uh get rid of instead of

158
00:06:26,469 --> 00:06:24,160
throwing that away if we can reclaim it

159
00:06:29,350 --> 00:06:26,479
and process it just like you would in a

160
00:06:31,110 --> 00:06:29,360
in a very very capable um

161
00:06:32,550 --> 00:06:31,120
sewage processing system on planet earth

162
00:06:35,270 --> 00:06:32,560
if we can do that on a smaller scale

163
00:06:36,950 --> 00:06:35,280

here in space then we can greatly

164
00:06:38,790 --> 00:06:36,960
increase our ability

165
00:06:40,550 --> 00:06:38,800
to use water more effectively on planet

166
00:06:43,110 --> 00:06:40,560
earth and also to leave low earth orbit

167
00:06:44,710 --> 00:06:43,120
so for every pound of stuff that's on

168
00:06:46,950 --> 00:06:44,720
on space station right now it takes

169
00:06:48,950 --> 00:06:46,960
about 20 to 25 pounds

170
00:06:50,629 --> 00:06:48,960
of high explosive in the form of rocket

171
00:06:53,670 --> 00:06:50,639
propellant to get it up to low earth

172
00:06:55,909 --> 00:06:53,680
orbit and so it's very very expensive to

173
00:06:58,309 --> 00:06:55,919
get me here took an awful lot of fuel to

174
00:07:01,510 --> 00:06:58,319
get the water that we in in past years

175
00:07:03,270 --> 00:07:01,520
have brought aboard to drink and to uh

176
00:07:05,350 --> 00:07:03,280
through electrolysis breakdown into

177
00:07:06,870 --> 00:07:05,360
oxygen for us to breathe to bring that

178
00:07:08,710 --> 00:07:06,880
um through space shuttles or other kind

179
00:07:10,710 --> 00:07:08,720
of cargo vehicles it's a very expensive

180
00:07:12,309 --> 00:07:10,720
proposition in fact it would be a game

181
00:07:13,510 --> 00:07:12,319
changer it would be a show stopper if we

182
00:07:15,589 --> 00:07:13,520
were going to leave low earth orbit go

183
00:07:17,670 --> 00:07:15,599
to mars you could not do it that way

184
00:07:18,950 --> 00:07:17,680
so if we can figure out a way to very

185
00:07:21,510 --> 00:07:18,960
very carefully

186
00:07:22,629 --> 00:07:21,520
process the waste products here onboard

187
00:07:24,230 --> 00:07:22,639
space station and we're pretty

188
00:07:26,550 --> 00:07:24,240

successful at doing that right now and

189
00:07:28,230 --> 00:07:26,560
recycle that then it has applicability

190
00:07:31,110 --> 00:07:28,240
on planet earth as well it's very very

191
00:07:33,749 --> 00:07:31,120
difficult to d to do desalinization for

192
00:07:35,749 --> 00:07:33,759
example and to take water that's um

193
00:07:37,350 --> 00:07:35,759
that's undrinkable and make it drinkable

194
00:07:38,790 --> 00:07:37,360
and this technology we have here right

195
00:07:41,350 --> 00:07:38,800
now is being used in a lot of third

196
00:07:43,909 --> 00:07:41,360
world countries and disaster zones on

197
00:07:46,230 --> 00:07:43,919
small scales to basically provide a very

198
00:07:49,029 --> 00:07:46,240
good very effective reverse osmosis

199
00:07:50,869 --> 00:07:49,039
means to purify water

200
00:07:52,550 --> 00:07:50,879
our next question is from the maritime

201
00:07:55,189 --> 00:07:52,560
academy of science and technology in

202
00:07:59,990 --> 00:07:55,199
beautiful virginia key just off downtown

203
00:08:04,790 --> 00:08:02,869
hello from mass academy in miami captain

204
00:08:06,950 --> 00:08:04,800
is there a research on the iss today

205
00:08:08,790 --> 00:08:06,960
that you can see having a lasting impact

206
00:08:10,629 --> 00:08:08,800
on the way we do things like the way

207
00:08:16,869 --> 00:08:10,639
steve jobs changed our lives with the

208
00:08:19,990 --> 00:08:18,790
great question those kinds of things

209
00:08:21,029 --> 00:08:20,000
things that are

210
00:08:23,510 --> 00:08:21,039
that

211
00:08:25,909 --> 00:08:23,520
radically change the way we live often

212
00:08:27,350 --> 00:08:25,919
are unpredictable and the the work that

213
00:08:30,550 --> 00:08:27,360

we're doing on space station right now

214
00:08:32,870 --> 00:08:30,560
hasn't generated that level of uh of a

215
00:08:34,870 --> 00:08:32,880
change um but it's the kind of thing

216
00:08:36,550 --> 00:08:34,880
where you're as you're doing various

217
00:08:38,790 --> 00:08:36,560
research and investigations it's the

218
00:08:40,230 --> 00:08:38,800
kind of things the aha moments the wow

219
00:08:42,070 --> 00:08:40,240
that's kind of funny i didn't expect

220
00:08:43,750 --> 00:08:42,080
that those kinds of results and they're

221
00:08:45,430 --> 00:08:43,760
very very difficult to predict so

222
00:08:47,430 --> 00:08:45,440
there's a lot of research going on right

223
00:08:49,110 --> 00:08:47,440
now literally hundreds of experiments

224
00:08:51,430 --> 00:08:49,120
and already hundreds have been done on

225
00:08:53,190 --> 00:08:51,440
space station it's not just work done by

226
00:08:55,350 --> 00:08:53,200
the six crew members out on board space

227
00:08:56,949 --> 00:08:55,360
station it is in fact done by thousands

228
00:08:59,509 --> 00:08:56,959
of people all around the world and when

229
00:09:01,269 --> 00:08:59,519
we're sleeping a lot of work is also

230
00:09:03,590 --> 00:09:01,279
being done so that data is being

231
00:09:05,030 --> 00:09:03,600
collected and we're all very hopeful

232
00:09:06,710 --> 00:09:05,040
that a lot of very important things will

233
00:09:08,070 --> 00:09:06,720
come out of it but right now we're

234
00:09:09,829 --> 00:09:08,080
living on a frontier and this is a

235
00:09:11,670 --> 00:09:09,839
difficult thing to do it's difficult to

236
00:09:14,070 --> 00:09:11,680
keep humans alive here it's difficult to

237
00:09:15,829 --> 00:09:14,080
keep equipment functioning here so we're

238
00:09:17,509 --> 00:09:15,839

very happy to do all those things and

239
00:09:21,110 --> 00:09:17,519
also try to push the frontier a little

240
00:09:24,790 --> 00:09:22,790
back up north our first

241
00:09:27,670 --> 00:09:24,800
question from an incredible local school

242
00:09:29,590 --> 00:09:27,680
of stem magnet high school in new london

243
00:09:31,590 --> 00:09:29,600
connecticut

244
00:09:33,269 --> 00:09:31,600
hello captain we are from the science

245
00:09:34,870 --> 00:09:33,279
and technology magnet high school of

246
00:09:36,949 --> 00:09:34,880
southeast connecticut

247
00:09:39,190 --> 00:09:36,959
we read that a new spectrometer has been

248
00:09:42,230 --> 00:09:39,200
added to the space station by using this

249
00:09:43,590 --> 00:09:42,240
machine to analyze cosmic rays have you

250
00:09:48,230 --> 00:09:43,600
discovered anything new about

251
00:09:51,190 --> 00:09:49,590
and this kind of goes back to that last

252
00:09:53,190 --> 00:09:51,200
question as well lots of data has been

253
00:09:55,910 --> 00:09:53,200
gathered millions of particles galactic

254
00:09:57,670 --> 00:09:55,920
cosmic rays and antimatter particles

255
00:09:59,430 --> 00:09:57,680
have been gathered by the alpha magnetic

256
00:10:00,949 --> 00:09:59,440
spectrometer it's going to take a long

257
00:10:03,030 --> 00:10:00,959
time and a lot of processing of that

258
00:10:04,790 --> 00:10:03,040
data to be able to to figure out the

259
00:10:06,470 --> 00:10:04,800
kinds of questions the big questions

260
00:10:09,110 --> 00:10:06,480
that that that machine is designed to

261
00:10:11,829 --> 00:10:09,120
answer specifically when we look at at

262
00:10:13,750 --> 00:10:11,839
space most of what we see is actually a

263
00:10:15,350 --> 00:10:13,760

small fraction all the things that glow

264
00:10:17,030 --> 00:10:15,360
stars and things like that are things

265
00:10:19,829 --> 00:10:17,040
that shine with reflected light all of

266
00:10:23,110 --> 00:10:19,839
those are very very small subsection of

267
00:10:25,350 --> 00:10:23,120
of the matter of of uh of our universe

268
00:10:27,910 --> 00:10:25,360
so dark matter is roughly two-thirds or

269
00:10:31,190 --> 00:10:27,920
three-quarters of what of what we would

270
00:10:32,790 --> 00:10:31,200
consider as as fundamental matter simply

271
00:10:34,630 --> 00:10:32,800
you know made of baryons made of the

272
00:10:36,069 --> 00:10:34,640
kinds of things that we're made of so a

273
00:10:38,630 --> 00:10:36,079
lot of it just doesn't shine it doesn't

274
00:10:40,550 --> 00:10:38,640
shine at all we don't know why the ams

275
00:10:43,430 --> 00:10:40,560
will help us answer that but beyond that

276
00:10:45,509 --> 00:10:43,440
there's still another vast majority of

277
00:10:46,630 --> 00:10:45,519
the constituents of the universe that we

278
00:10:48,630 --> 00:10:46,640
would call

279
00:10:50,630 --> 00:10:48,640
dark energy and we don't even know the

280
00:10:51,829 --> 00:10:50,640
nature of that so it's an important

281
00:10:55,190 --> 00:10:51,839
experiment but it's going to take an

282
00:11:00,710 --> 00:10:57,350
and one to the second question from

283
00:11:04,230 --> 00:11:02,389
captain do you think there could be

284
00:11:05,910 --> 00:11:04,240
earth-like life on one of the planets

285
00:11:11,430 --> 00:11:05,920
orbiting a star that's visible in the

286
00:11:15,430 --> 00:11:13,350
there's a lot of great experiments going

287
00:11:17,190 --> 00:11:15,440
out right now by by other vehicles

288
00:11:18,949 --> 00:11:17,200

kepler for example is one of them and a

289
00:11:20,790 --> 00:11:18,959
lot of research being done by

290
00:11:23,110 --> 00:11:20,800
observatories on the ground run by

291
00:11:24,710 --> 00:11:23,120
people all around the world and i think

292
00:11:26,870 --> 00:11:24,720
when you just look at the numbers to me

293
00:11:29,110 --> 00:11:26,880
it's highly likely that there is going

294
00:11:31,030 --> 00:11:29,120
to be many earth-like planets orbiting

295
00:11:32,790 --> 00:11:31,040
stars that are very similar to our sun

296
00:11:34,870 --> 00:11:32,800
and many of those planets will be in

297
00:11:36,790 --> 00:11:34,880
what we would call the habitable zone

298
00:11:38,550 --> 00:11:36,800
there are hundreds of millions of stars

299
00:11:40,470 --> 00:11:38,560
in the milky way galaxy and hundreds and

300
00:11:42,630 --> 00:11:40,480
hundreds of millions of galaxies in the

301
00:11:44,389 --> 00:11:42,640
universe a known universe so i think

302
00:11:45,829 --> 00:11:44,399
it's highly likely there will be but

303
00:11:48,069 --> 00:11:45,839
it's going to take a long time to find

304
00:11:49,990 --> 00:11:48,079
them i think

305
00:11:53,110 --> 00:11:50,000
continuing south we have question number

306
00:11:55,269 --> 00:11:53,120
two from atlanta

307
00:12:03,829 --> 00:11:55,279
a really practical question how do

308
00:12:07,910 --> 00:12:05,829
i think i missed the question if you

309
00:12:10,389 --> 00:12:07,920
could repeat that please

310
00:12:16,870 --> 00:12:10,399
so a really practical question

311
00:12:21,190 --> 00:12:19,670
okay how do we do laundry on the iss

312
00:12:23,509 --> 00:12:21,200
in a word we don't

313
00:12:25,350 --> 00:12:23,519

right now we don't and that's something

314
00:12:27,430 --> 00:12:25,360
that there's been some work done already

315
00:12:29,030 --> 00:12:27,440
on the ground to to to work towards that

316
00:12:30,790 --> 00:12:29,040
goal but it's a really difficult thing

317
00:12:32,470 --> 00:12:30,800
to do taking a shower up here is not a

318
00:12:34,550 --> 00:12:32,480
practical thing to do as well so we

319
00:12:37,030 --> 00:12:34,560
clean ourselves essentially by taking a

320
00:12:38,389 --> 00:12:37,040
sponge bath if you will and that works

321
00:12:40,629 --> 00:12:38,399
and it even works for six months you'd

322
00:12:43,030 --> 00:12:40,639
be surprised uh but the clothing we

323
00:12:44,870 --> 00:12:43,040
essentially have new clothing and we

324
00:12:46,389 --> 00:12:44,880
pack it efficiently or the people on the

325
00:12:48,310 --> 00:12:46,399
ground to pack it efficiently and send

326
00:12:50,150 --> 00:12:48,320
it to us but but we don't change clothes

327
00:12:51,990 --> 00:12:50,160
quite as often as you do on the ground

328
00:12:53,190 --> 00:12:52,000
and we don't have a practical means to

329
00:12:54,790 --> 00:12:53,200
clean it and it's probably not an

330
00:12:56,629 --> 00:12:54,800
effective use of our time i think right

331
00:12:58,310 --> 00:12:56,639
now

332
00:13:00,949 --> 00:12:58,320
dan i pictured your clothes hanging on

333
00:13:04,790 --> 00:13:00,959
the treadmill on to question two from

334
00:13:08,550 --> 00:13:06,870
captain is the iss involved in the

335
00:13:10,470 --> 00:13:08,560
aeronomy of ice in the mesophyll

336
00:13:17,190 --> 00:13:10,480
research and do you think this research

337
00:13:20,870 --> 00:13:19,269
yeah the the aim mission

338
00:13:22,870 --> 00:13:20,880

is

339
00:13:25,030 --> 00:13:22,880
designed to investigate what we call

340
00:13:28,150 --> 00:13:25,040
noctilucine clouds or night shining

341
00:13:30,629 --> 00:13:28,160
clouds also called polar meso mesosphere

342
00:13:32,069 --> 00:13:30,639
clouds and i don't think that anybody at

343
00:13:34,389 --> 00:13:32,079
this point fully understands the

344
00:13:36,230 --> 00:13:34,399
mechanism and how these work from space

345
00:13:38,069 --> 00:13:36,240
station we can see them we image them we

346
00:13:41,269 --> 00:13:38,079
send those images to the ground and that

347
00:13:42,949 --> 00:13:41,279
contributes uh to projects like aim but

348
00:13:45,189 --> 00:13:42,959
we don't specifically have any any

349
00:13:47,509 --> 00:13:45,199
direct tasking to do that

350
00:13:49,189 --> 00:13:47,519
polar meso mesophyric clouds are a

351
00:13:50,790 --> 00:13:49,199
relatively

352
00:13:52,389 --> 00:13:50,800
new phenomenon at least they're more

353
00:13:53,910 --> 00:13:52,399
frequent now than they had been in years

354
00:13:56,230 --> 00:13:53,920
and you know years past and whether

355
00:13:58,389 --> 00:13:56,240
that's tied to global climate change is

356
00:14:00,790 --> 00:13:58,399
really i think unclear at this point

357
00:14:02,710 --> 00:14:00,800
it's very interesting it's they're very

358
00:14:04,150 --> 00:14:02,720
beautiful to see and we take a lot of

359
00:14:05,509 --> 00:14:04,160
imagery of them and we send it to the

360
00:14:06,949 --> 00:14:05,519
ground

361
00:14:10,230 --> 00:14:06,959
and we're back to connecticut for

362
00:14:12,230 --> 00:14:10,240
question number two from new london

363
00:14:15,030 --> 00:14:12,240

hey captain i'm cj parker and this is

364
00:14:16,230 --> 00:14:15,040
kyrie kader and our question is sir

365
00:14:18,069 --> 00:14:16,240
there been any

366
00:14:19,670 --> 00:14:18,079
experiments on the assets involving

367
00:14:25,509 --> 00:14:19,680
non-human animals and what might fisher

368
00:14:28,470 --> 00:14:26,949
there has i don't know a lot about the

369
00:14:30,470 --> 00:14:28,480
details of them we've had spiders up

370
00:14:32,870 --> 00:14:30,480
here and we've studied how

371
00:14:34,629 --> 00:14:32,880
the effects of weightlessness

372
00:14:36,550 --> 00:14:34,639
influence their construction of spider

373
00:14:38,550 --> 00:14:36,560
webs for example

374
00:14:40,389 --> 00:14:38,560
i imagine there are some plans down the

375
00:14:41,509 --> 00:14:40,399
road to right now on board space station

376
00:14:43,670 --> 00:14:41,519
we don't have any there are not any

377
00:14:45,910 --> 00:14:43,680
specific plans towards that depending on

378
00:14:48,389 --> 00:14:45,920
your definition of animals we do to a

379
00:14:50,389 --> 00:14:48,399
degree and have done a lot of studies of

380
00:14:53,269 --> 00:14:50,399
microbial life for example for some

381
00:14:54,389 --> 00:14:53,279
reason and it's not entirely clear a lot

382
00:14:56,949 --> 00:14:54,399
of

383
00:14:59,030 --> 00:14:56,959
microbes become more virulent and more

384
00:15:00,310 --> 00:14:59,040
hazardous to humans in a weightless

385
00:15:02,230 --> 00:15:00,320
environment it may have to do with the

386
00:15:03,829 --> 00:15:02,240
radiation of space it may have to do

387
00:15:07,269 --> 00:15:03,839
with weightlessness i'm not sure that we

388
00:15:08,870 --> 00:15:07,279

know entirely but for example

389
00:15:10,550 --> 00:15:08,880
salmonella there were studies done on

390
00:15:12,550 --> 00:15:10,560
salmonella up here and the fact that

391
00:15:14,550 --> 00:15:12,560
salmonella would change in the space

392
00:15:16,629 --> 00:15:14,560
environment and you could compare that

393
00:15:18,550 --> 00:15:16,639
you know the the uh the salmonella from

394
00:15:20,150 --> 00:15:18,560
space to salmonella on the ground

395
00:15:22,069 --> 00:15:20,160
allowed researchers on the ground to

396
00:15:23,990 --> 00:15:22,079
identify the gene that was different the

397
00:15:26,389 --> 00:15:24,000
controlling gene effect you know that

398
00:15:28,870 --> 00:15:26,399
effectively uh you know resulted in that

399
00:15:30,790 --> 00:15:28,880
change and that's helping to does to

400
00:15:33,430 --> 00:15:30,800
allow the allow teams on the ground to

401
00:15:36,150 --> 00:15:33,440
design drugs to specifically target and

402
00:15:37,829 --> 00:15:36,160
combat salmonella poisoning for example

403
00:15:40,310 --> 00:15:37,839
it looks very promising that the same

404
00:15:43,990 --> 00:15:40,320
thing could be done for staph infections

405
00:15:46,790 --> 00:15:44,000
or methyl methicillin resistant staph

406
00:15:48,710 --> 00:15:46,800
and it's uh mrsa sometimes called so

407
00:15:50,790 --> 00:15:48,720
we're doing studies on that level as

408
00:15:51,829 --> 00:15:50,800
well and interestingly at the same time

409
00:15:54,310 --> 00:15:51,839
that some

410
00:15:55,350 --> 00:15:54,320
bacteria and microbes become more

411
00:15:56,470 --> 00:15:55,360
virulent

412
00:15:58,550 --> 00:15:56,480
the human

413
00:16:00,310 --> 00:15:58,560

body immune system actually gets

414
00:16:02,230 --> 00:16:00,320
suppressed to a certain degree so ours

415
00:16:03,910 --> 00:16:02,240
is not as effective up here thankfully

416
00:16:05,350 --> 00:16:03,920
thankfully we've all been pretty healthy

417
00:16:07,189 --> 00:16:05,360
and it hasn't been an issue but it's an

418
00:16:08,389 --> 00:16:07,199
interesting effect

419
00:16:11,269 --> 00:16:08,399
and we're back to

420
00:16:19,269 --> 00:16:13,269
captain burbank what is the typical day

421
00:16:23,030 --> 00:16:21,030
i think the typical day on iss is

422
00:16:25,189 --> 00:16:23,040
atypical there's really no such thing as

423
00:16:27,670 --> 00:16:25,199
a typical day and and that's actually

424
00:16:29,829 --> 00:16:27,680
one of the beauties of it it's um it's a

425
00:16:31,430 --> 00:16:29,839
delightful place to work every day is

426
00:16:33,269 --> 00:16:31,440
different every day is spectacular in

427
00:16:34,790 --> 00:16:33,279
its own right every day you have the

428
00:16:36,550 --> 00:16:34,800
opportunity to go to the window and look

429
00:16:39,430 --> 00:16:36,560
at this unbelievable planet from the

430
00:16:41,030 --> 00:16:39,440
vantage point of 240 miles above

431
00:16:42,949 --> 00:16:41,040
we get to do everything from spacewalks

432
00:16:45,189 --> 00:16:42,959
to robotics operations to science

433
00:16:47,350 --> 00:16:45,199
experiments to just living and being in

434
00:16:48,710 --> 00:16:47,360
space and it is one of the neatest parts

435
00:16:51,430 --> 00:16:48,720
but every day is different the

436
00:16:53,189 --> 00:16:51,440
opportunity to talk to great kids with

437
00:16:55,350 --> 00:16:53,199
phenomenal questions like you've got for

438
00:16:56,550 --> 00:16:55,360

example is a real treat that we

439
00:16:59,670 --> 00:16:56,560
occasionally

440
00:17:01,670 --> 00:16:59,680
are fortunate enough to have

441
00:17:04,390 --> 00:17:01,680
well no time for trips to taco bell and

442
00:17:06,710 --> 00:17:04,400
we're on to atlanta

443
00:17:09,829 --> 00:17:06,720
hello sir my name is brianna griffin

444
00:17:11,590 --> 00:17:09,839
yeah it's me roger ashley kylie sir in

445
00:17:14,069 --> 00:17:11,600
108 years we saw from the wright

446
00:17:15,990 --> 00:17:14,079
brothers first flight to the iss how

447
00:17:17,750 --> 00:17:16,000
long will it take to develop an aircraft

448
00:17:23,110 --> 00:17:17,760
that can travel at or near the speed of

449
00:17:27,029 --> 00:17:24,949
that's a good question you know some

450
00:17:29,669 --> 00:17:27,039
bicycle makers a little over 100 years

451
00:17:31,029 --> 00:17:29,679
ago made an airplane when uh most folks

452
00:17:32,549 --> 00:17:31,039
on planet earth didn't think that was

453
00:17:34,630 --> 00:17:32,559
ever possible

454
00:17:36,549 --> 00:17:34,640
i think a lot of folks on planet earth

455
00:17:37,350 --> 00:17:36,559
including some very educated ones think

456
00:17:41,990 --> 00:17:37,360
that

457
00:17:43,909 --> 00:17:42,000
to the speed of light is impossible so

458
00:17:45,669 --> 00:17:43,919
it's kind of hard to say at this stage

459
00:17:48,710 --> 00:17:45,679
to predict in the future i would say

460
00:17:49,590 --> 00:17:48,720
this though that the physics that made

461
00:17:52,310 --> 00:17:49,600
uh

462
00:17:55,350 --> 00:17:52,320
air you know airplane travel possible

463
00:17:57,110 --> 00:17:55,360

was relatively well known or at least it

464
00:18:00,070 --> 00:17:57,120
was the kinds of effects you know we

465
00:18:03,029 --> 00:18:00,080
could see how birds fly for example

466
00:18:04,230 --> 00:18:03,039
you know long before 1904

467
00:18:06,630 --> 00:18:04,240
it is

468
00:18:08,710 --> 00:18:06,640
another late many orders of magnitude

469
00:18:10,710 --> 00:18:08,720
more difficult to contemplate going to

470
00:18:12,710 --> 00:18:10,720
the speed of light there it is it's

471
00:18:14,950 --> 00:18:12,720
going to require an entirely different

472
00:18:16,870 --> 00:18:14,960
set of physics or entirely fundamentally

473
00:18:18,630 --> 00:18:16,880
different understanding of physics for

474
00:18:20,789 --> 00:18:18,640
us to get to that point i think it's a

475
00:18:22,230 --> 00:18:20,799
long ways out

476
00:18:24,070 --> 00:18:22,240
well unfortunately

477
00:18:25,590 --> 00:18:24,080
we're short of time there's a whole long

478
00:18:26,950 --> 00:18:25,600
list of questions

479
00:18:28,390 --> 00:18:26,960
captain burbank

480
00:18:29,830 --> 00:18:28,400
all the students who've asked questions

481
00:18:32,310 --> 00:18:29,840
who are listening who were waiting to

482
00:18:35,750 --> 00:18:32,320
ask questions thank you all for this

483
00:18:37,190 --> 00:18:35,760
great event uh dan uh and the crew have

484
00:18:39,750 --> 00:18:37,200
an incredible journey and we look

485
00:18:42,150 --> 00:18:39,760
forward to your return home on the 16th

486
00:18:43,830 --> 00:18:42,160
of march uh this is united states coast

487
00:18:46,870 --> 00:18:43,840
guard academy turning it back over to

488
00:18:50,950 --> 00:18:48,950

okay and uh and thanks again very much

489
00:18:52,070 --> 00:18:50,960
and i apologize for the for the folks

490
00:18:53,830 --> 00:18:52,080
that um

491
00:18:55,270 --> 00:18:53,840
we weren't able to ask their questions

492
00:18:57,430 --> 00:18:55,280
today these are great questions tough

493
00:18:58,710 --> 00:18:57,440
questions you had me sweating so i was

494
00:19:00,310 --> 00:18:58,720
probably a little more long-winded than

495
00:19:02,710 --> 00:19:00,320
i needed to be but i would just

496
00:19:04,470 --> 00:19:02,720
encourage you to uh to continue to

497
00:19:05,830 --> 00:19:04,480
pursue these kinds of interests this is

498
00:19:08,470 --> 00:19:05,840
the engine

499
00:19:10,549 --> 00:19:08,480
of our future it is the the ideas and

500
00:19:12,789 --> 00:19:10,559
the energy and the

501
00:19:14,870 --> 00:19:12,799
the the mental power that you have and

502
00:19:16,150 --> 00:19:14,880
you're already displaying so i think i

503
00:19:18,310 --> 00:19:16,160
think we've got a wonderfully bright

504
00:19:20,789 --> 00:19:18,320
future and we have a bright future like

505
00:19:23,029 --> 00:19:20,799
that because of kids like you so keep up

506
00:19:24,630 --> 00:19:23,039
the great work and down the road if

507
00:19:29,750 --> 00:19:24,640
you'd like we'd sure love to have you

508
00:19:34,870 --> 00:19:31,430
station this is houston acr that

509
00:19:38,710 --> 00:19:36,470
thank you united states coast guard